The Power of Mindful Breathing: A Mindfulness-Based Intervention for Anxiety

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THE POWER OF MINDFUL BREATHING: A MINDFULNESS-BASED INTERVENTIONS FOR ANXIETY

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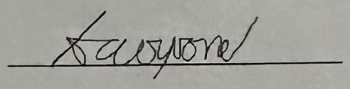

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ABSTRACT

The Power of Mindful Breathing: A Mindfulness-Based Intervention for Anxiety

by Yvone Dao

Mindfulness-based intervention, which was brought to Western psychotherapy by Jon Kabat in the 1980s, has received recognition as a successful approach for psychological treatment. Rooted in Buddhist philosophy, these techniques are particularly significant for addressing anxiety, a condition that affects about one-third of adults and adolescents in the U.S. (WHO, 2023)(*Anxiety Disorders*, n.d.-a). This discussion contends that mindfulness therapy is effective both on its own and as a complement to medication therapy for anxiety. It focuses on the mindfulness breathing exercises found in Buddhist scriptures that are often overlooked or briefly mentioned in current research. In support of this argument, multiple studies will be presented that demonstrate the effectiveness of mindfulness in alleviating anxiety. Important Buddhist texts such as the Ānāpānassati Sutta, the Mahāsatipaṭṭhāna Sutta, and related Buddhist commentaries will be used to show how mindful breathing brings calm, reduces fear, and supports mental healing. These teachings are intended to benefit every individual, going beyond religious differences and promoting healing for both the mind and body. Healing the mind can also enhance physical well-being. The author earned a Doctor of Pharmacy degree from the University of Southern Nevada in 2010 and is licensed to practice in California. She is fluent in both Vietnamese and English. With over five years of study in both Vietnamese and English Dharma courses at Sakya Buddha University, she has gained valuable insight into the Buddha's teachings, which focus on healing suffering and addressing mental challenges. Through this lens, she sees mindfulness breathing as a powerful path toward equanimity and inner balance. The

author aims to promote the use of breathing techniques in treating anxiety, highlighting the benefits of Buddhist yogic practices in modern healthcare.

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CHAPTER 1: INTRODUCTION

1.1 Research Questions

Mental health disorders are a major global health concern, impacting approximately 301 million people in 2019 (WHO, 2023) and rising to nearly 970 million by 2024 (*The Latest Mental Health Statistics*, 2024). Anxiety is currently one of the highest concern in mental health disorder. According to the National Alliance on Mental Illness, around 40 million adults in the U.S.—about 19% of the population—were living with anxiety in 2017 (Nami, 2017). In 2024, nearly 43% of adults experienced some form of anxiety—a reflection of the growing unrest in the minds (*American Adults Express Increasing Anxiousness in Annual Poll; Stress and Sleep Are Key Factors Imp*, 2024). The American Psychiatric Association noted that anxiety is more commonly experienced by women than by men (APA, n.d.). If left untreated, anxiety can worsen over time, adversely impacting job performance, academic success, and interpersonal relationships, gradually wearing down a person's condition of wellness and sense of peace. Its impact extends into daily relationships and social interactions. Bazely (2023) noted one sign of this is social withdrawal, often caused by shyness and a lack of confidence. In some cases, individuals may struggle to work effectively with others, making remote work a preferable option. In other instances, anxiety can lead to low self-esteem and doubts about their relationships (Bazely, 2023). Mindfulness and medication are the two dominant treatment approaches currently used in the U.S.

In view of the above, the research questions for this project are as follows: How does mindfulness-based intervention (MBI) compare to pharmacotherapy in terms of effectiveness for treating anxiety? Should mindfulness of breathing be considered an adjunct to pharmacotherapy

for anxiety treatment? Can mindful breathing effectively treat anxiety as a standalone therapy? What is the connection between traditional Buddhist practices and the modern health field? This project aims to explore and answer key questions about the effectiveness of mindful breathing in treating anxiety. Chapter 1 will introduce the thesis topic and research questions, provide background information on anxiety, offer an overview of relevant literature, and briefly present the author's background. Chapter 2 will define anxiety from psychological and clinical perspectives, review current medication-based treatments, and then shift to literature that defines mindfulness. It will also introduce the specific Buddhist scriptures (suttas) that support the use of mindful breathing as a standalone therapy for anxiety. Chapter 3 will detail the research methods used and review the four main classes of anxiety medications, including their effectiveness and typical dosages. This will be followed by a review of existing literature on mindful breathing techniques, concluding with a discussion of these practices from a Buddhist perspective. Chapter 4 will present the findings, highlighting the benefits of mindful breathing as revealed through both modern scientific research and Buddhist teachings, building on the insights discussed in Chapters 2 and 3. Finally, Chapter 5 will answer the four central thesis questions, and discuss the study's limitations, strengths, and suggestions for future research.

1.2 Thesis

Research studies and clinical trials within Chapter 2 and Chapter 3 of this project have shown that mindfulness-based intervention (MBI) has the ability to treat anxiety and improve individual vitality. This thesis examines how mindfulness-based intervention, specifically breathing meditation, rooted in Buddhist tradition, is as effective as or more effective than pharmacotherapy in treating anxiety disorders, offering both immediate relief and long-term benefits.

1.3 Prevalent Background of Anxiety

The World Health Organization has categorized anxiety disorders—including Generalized Anxiety Disorder (GAD), Social Anxiety Disorder (SAD), Panic Disorder (PD), and specific Phobias (WHO, 2023). The National Alliance on Mental Illness (NAMI) defines Generalized Anxiety Disorder as persistent and overwhelming sense of worry about everyday matters, which makes it challenging for individuals to feel calm or at ease (NAMI, 2017). Social Anxiety Disorder causes people to avoid social situations because they fear being judged, which can sometimes lead to panic attacks. Panic Disorder involves having repeated panic attacks with symptoms such as upset stomach, trembling, sweating, chills, fear, shortness of breath, and a racing heart. Phobias are intense and irrational fears of specific things, situations, animals, or places (NAMI, 2017). These symptoms can severely limit a person's opportunity to engage in daily activities.

The causes of anxiety disorders can stem from both genetic and environmental factors (Hanson & Mendius, 2009). Research indicates that individuals with family histories of anxiety disorders may be more predisposed to developing similar issues. Moreover, surrounding factors such as violence, stress, traumatic events, and various forms of abuse are also recognized as significant contributors to the onset of anxiety ("Anxiety Disorders," n.d.-). Fear arises from both implicit and explicit memories. "Implicit memories are rooted in past experiences" (Hanson & Mendius, 2009, pp 74-75), often carrying residual fear, while explicit memories involve the continuous recording of present events. When both areas become over sensitized, it can lead to an increase in anxiety attacks (Hanson & Mendius, 2009). During this heightened state, the accuracy of both "implicit and explicit memories becomes compromised, causing the individual to fear triggers or signs that resemble past experiences" (Hanson & Mendius, 2009, p75).

There are common, significant, and uncontrollable symptoms that occur during states of anxiety. Individuals diagnosed with anxiety disorders often experience overwhelming feelings of worry and fear that arise without clear reasons (WHO, 2023). These emotional responses can lead to various physical symptoms, such as heart palpitations, irritability, difficulty concentrating, and trouble sleeping. Anxiety can also manifest through muscle tension, headaches, and gastrointestinal issues (WHO, 2023). These symptoms are often triggered by anxious thoughts, contributing to emotional and physiological changes that can complicate daily life. Moreover, anxiety disorders can serve as precursors to other mental health issues such as depression and suicidal behaviors (WHO, 2023).

Anxiety symptoms can impact both physical and mental health, leading to various negative effects. For instance, physical manifestations such as racing heart rate and difficult breathing are closely linked to chemical changes in the body, particularly those occurring in the brain. Neurotransmitters are chemicals that influence mood and are produced in the brain, are essential for the formation and expression of anxiety (Hanson & Mendius, 2009, p43). The primary neurotransmitters associated with anxiety include serotonin, dopamine, and norepinephrine (Hanson & Mendius, 2009, p43). Serotonin helps regulate mood, sleep, and digestion, playing a crucial role in maintaining emotional balance (Hanson & Mendius, 2009). Dopamine is associated with reward sensation and focus, while norepinephrine is instrumental in regulating alertness and arousal (Hanson & Mendius, 2009). During an anxiety attack, serotonin and dopamine levels drop, while norepinephrine rises above normal levels. The decrease in serotonin can lead to increased aggression and defensiveness, and lower dopamine may intensify fear responses (Seo et al., 2008). Elevated norepinephrine overstimulates the fight-or-flight system, making the body react as if it's under real threat (*Adrenal Hormones*, 2022). Together,

these chemical imbalances contribute to the physical symptoms of anxiety, mood swings, and an exaggerated stress response (Hanson & Mendius, 2009).

The brain is naturally wired to detect signs of fear and threat more quickly than signals of happiness, reflecting an innate survival instinct (Hanson & Mendius, 2009). This irrational fear and worry can result in a decrease in essential neurotransmitters like dopamine, and serotonin (Hanson & Mendius, 2009). This orientation can lead individuals to focus on negative experiences, which are often processed more deeply than positive ones (Hanson & Mendius, 2009). Unfortunately, this ongoing negative mindset can exacerbate anxiety disorders, forming a vicious cycle of fear and worry that is challenging to overcome (Hanson & Mendius, 2009). Mindfulness and medication can help people manage these symptoms, support healthier ways of coping, and improve their psychological health. It is important to grasp the details of anxiety disorders to provide proper treatment and support.

In Buddhism, the path to liberation involves understanding the root causes of suffering and "training the mind to cultivate a virtuous life and well-being" (Goleman & Davidson, 2018, p. 55). Thich Nhat Hanh (2006), in his book *Understanding Our Minds*, explained that each person has a store of consciousness, which contains both negative and positive habit energies. These energies arise from our "environment, ancestors, and our notion of self" (N. Thich, 2006, p. 39,46). One way to transform negative energy into positivity is through mindful breathing. By practicing mindful breathing, we bring awareness to the body, both internally and externally, and begin to detach from the self (N. Thich, 2006). This practice helps us let go of emotions such as "fear, anger, sadness, and phobias" (Harvey et al., 2017, p. 271). Ultimately, no one but ourselves can transform our sensations and our grip on fear and sadness. Buddhism does not

seek to convert anyone but rather offers a way to cultivate wisdom and heal both the body and mind.

1.4 Overview of Literatures

In this project a selection of existing reviews will be utilized to illustrate the usefulness of mindfulness-based interventions (MBI) and compare them to pharmacotherapy, specifically in reducing anxiety symptoms. These will be analyze below. There are various treatments available for anxiety, primarily categorized into two classes: psychotherapy and pharmacotherapy. Pharmacotherapy refers to the use of medications in healthcare treatment. The supporting literatures for pharmacotherapy will be discuss first. Additionally, clinical data on medications—Escitalopram, Venlafaxine, Amitriptyline, Lorazepam—demonstrate their efficacy and highlight important warnings. Clinical trials are research studies with people that test how safe and effective new medical treatments, procedures, or devices are. These researchers and their findings will be introduced in the literature review section. Psychotherapy is a way of helping people feel better by seeking care with a trained therapist about their thoughts, feelings, and behaviors. This project will focus on using mindfulness of breathing both as a standalone treatment and as an integrated component of psychotherapy for anxiety.

One of the key aspects of MBI is the breathing technique, which is an essential foundation of many mindfulness practice. Thich Nhat Hanh defined mindfulness as the awareness of the current moment and it is the "salvation to our anger fear and despair" (Thich Nhat Hanh, 2007). The purpose of mindfulness-based programs is to help individuals develop awareness in their everyday lives. These programs are generally designed as flexible approaches that incorporate mindfulness into psychotherapy, aiming to manage mental health conditions like stress, anxiety, and others. Over time, they have evolved into well-known forms such as mindfulness-based cognitive therapy (MBCT), Mindfulness-Based Stress Reduction (MBSR),

and more (Shapero et al., 2018). Focusing on the breath brings the mind into focus, reduces distractions, and offers benefits for health and mental clarity (Hanson & Mendius, 2009).

In 1980, Jon Kabat-Zinn—often considered the father of Mindfulness-Based Interventions (MBIs)—developed the first Mindfulness-Based Stress Reduction (MBSR) program as a new approach to treating psychological symptoms like anxiety within Western healthcare. He now lives in New York and has studied mindfulness and different types of meditation with several Buddhist teachers, including Ven. Thich Nhat Hanh, Philip Kapleau, and Seung Sah. Different styles of mindfulness meditation, such as sitting, body sensation awareness, breathing techniques, and acceptance mindfulness, have been incorporated across various studies to address a range of psychological conditions (Komariah et al., 2022, p.9). A brief overview of the literature will be provided in Chapter 2 and Chapter 3 to highlight and support the effectiveness of mindfulness, particularly its application in addressing anxiety. By examining various research outcomes and Buddhist scriptures, the later sections will show how mindfulness techniques, mindful breathing, have proven effective in managing anxiety symptoms. These will be discussed in detail in the literature review and methodology section.

This project will examine the breathing technique through the practices described in the Pali Sutta and its relevance within the context of Vipassana meditation in literature and methodology sections. The Sutta presents 16 structured breathing exercises, deeply rooted in traditional Buddhist scriptures and commentaries. These 16 breathing exercises correspond to the four stages of Vipassana. The author of this project will focus on the first four steps out of the 16 exercises. The first stage of Vipassana practice is mindfulness of the body, which is developed through the initial four steps as the primary goal is to calm the body and reduce anxiety. Exploring stages beyond the mindfulness of body would require more advanced and

complex explanations, which may not fit within the scope of this master's thesis. The mindfulness-based interventions (MBIs) section, particularly the 16 breathing exercises that are often overlooked in many MBI treatments will be explore. These exercises are supported by Buddhist scriptures and are incorporated into retreats led by prominent Buddhist leaders. This project will explain how they connect traditional Buddhism with contemporary healthcare approaches. By presenting these yogic techniques, the discussion will aim to demonstrate how these practices may offer an alternative or complementary approach to pharmaceutical treatments specifically targeted at treating anxiety. To clarify the earlier explanation, the term "yogic" carries a meaning, highlighting the integration of body and mind as rooted in ancient traditions. The term "alternative" in healthcare refers to other treatment options that are equally or similarly effective. Lastly, "complementary" means supporting or enhancing the main treatment.

1.5 Background of the author and motivation

The author has been working as a Doctor of Pharmacy in California, USA for over ten years. She has been engaged dispensing anxiety medications and obtained knowledge in the mechanism as well as the effect of commonly medications use for antianxiety. The author is a Buddhist and has been participating in the Vietnamese Dharma programs for 6 years at Sakya Buddha University and currently pursuing Master Degree in Buddhist Philosophy. She was exposed to Buddhist teachings in different lineage such as Theravada, Mahayana, Vajrayana. She has been practicing the first two steps of the 16 breathing meditation techniques to relief stressful working environment and daily task. After practicing for two years consistently, she has seen the positive effect , reducing anxiety and stress from meditation has motivated the author to choose this topic in hope that it will be useful for those in need to have a healthy well-being. Breathing meditation has been the core of practice for Buddhism. With a background in

pharmacotherapy and Buddhism, the author aims to connect the practical teachings of Buddhism, rooted in a long lineage of wisdom, with contemporary society. This topic emphasizes the scientific basis of Buddhist philosophy, highlighting its potential as a valuable resource in the healthcare field. The author argues that Buddhist principles, grounded in mindfulness, mental discipline, and understanding of human nature, can offer significant benefits to healthcare practices, contributing to both mental and physical health in scientifically measurable ways.

The insights of mindfulness extract from Theravada Buddhist scriptures. In these ancient teachings, each inhalation and exhalation becomes a thread connecting us to the present, awakening a profound awareness that transcends the chaos of our minds. As the project explores this practice, it is anticipated that the subtle wisdom within the simplicity of mindful breathing will be uncovered, leading to a transformation in the understanding of each passing moment.

CHAPTER 2: LITERATURE REVIEW

2.1 What is Anxiety Literatures

Anxiety disorder is a growing concern mental illness worldwide. In this section literatures will explain the definitions of anxiety and treatments for anxiety disorders.

Michelle Craske, Ph.D. in psychology, is currently the Director of the Anxiety and Depression Research Center at UCLA, California (*Michelle G. Craske, Ph.D – Anxiety and Depression Research Center at UCLA*, n.d.). In 2011, Professor Craske and her team conducted a meta-analysis to evaluate anxiety, which arises from the anticipation of a potential negative event, often resulting in fear or tense reactions (Craske et al., 2011). Symptoms of anxiety include worry, avoidance, escape behaviors, sweating, trembling, palpitations, and nausea, which can vary or alternate during the anticipation process (Craske et al., 2011). These findings were

based on trials conducted with three populations: students, patients, and adults. The analysis concluded that there are distinct types of anxiety, including panic, generalized anxiety, social anxiety, and phobias (Craske et al., 2011).

Margaux Kenwood, a neuroscientist in New York (*Margaux Kenwood - IMPRINT Publication Science | LinkedIn*, n.d.), and her team conducted a review on the brain pathways involved in anxiety disorders. Kenwood et al. (2022) defined anxiety as a response to either certain or uncertain threats, which then initiates the defense mechanism. Anxiety, in this sense, serves as an adaptive survival ability. When the level of anxiety exceeds the control of the prefrontal cortex (PFC), fear and other physical and psychological responses are affected (Kenwood et al., 2022). The cortex works with the amygdala and thalamus to regulate the neural network involved in anxiety processing. When anxiety surpasses the PFC's regulatory capacity, distress symptoms appear. Kenwood et al. (2022) emphasized that although fear and anxiety often occur simultaneously, they are not the same. Fear happens when there's an immediate threat, while anxiety is the worry about something that might happen in the future, even if it's not real. She discovered that using both psychotherapy and pharmacotherapy together can be more effective for treating anxiety than relying on just one of them alone (Kenwood et al., 2022).

Dr. Xiang Zhou is a Ph.D. professor of Sociology at Harvard University (Zhou et al.,2020) defined anxiety as a condition that affects both physical and mental health. It can cause symptoms like increased heart rate, dizziness, sleep problems, and muscle tension. If anxiety continues over time, it may lead to the onset of related mental health issues, such as depression. Anxiety also creates a treatment burden and reduces quality of life (Zhou et al., 2020). Doctor Florence Thibaut (2017a) noted the most prevalent anxiety disorder is specific phobias, affecting 10.3% of individuals. This is followed by panic disorder at 6%, social phobias at 2.7%, and

generalized anxiety disorder at 2.2% (Thibaut, 2017). Dr. Zhou et al.(2020) and Dr. Thibaut (2017) noted that while medications can work in the short term, they often lead to relapse. They highlighted that mindfulness therapy has been proven effective in treating anxiety.

Christian Grillon, a researcher at the US National Institute of Mental Health, has written extensively on anxiety and its clinical aspects. He explained that fear is tied to the "fight or flight" response, a defense mechanism activated in life-or-death situations (Grillon et al., 2019). In contrast, anxiety involves a sense of aversion and uncertainty, which disrupts cognitive processes and creates an imbalance. While some diagnoses focus primarily on emotional expression, they often overlook the neural level, even though emotional and neural processes continuously interact. Grillon et al. (2019) highlighted that stimuli triggering hyperactivity in the amygdala can lead to chronic distress, which disrupts normal neural activity and further contributes to the imbalance in cognitive pathways (Grillon et al., 2019).

Suma P. Chand (Chand & Marwaha, 2025) is a medical doctor specializing in patients with depression and anxiety. She defined fear as a reaction to a specific threat, whereas anxiety is described as a state connected to that fear. Anxiety, however, involves cognitive and behavioral reactions to perceived future threats (Chand & Marwaha, 2025). In her continuing education section on anxiety, she used the Diagnostic and Statistical Manual of Mental Disorders (DSM) criteria as a diagnostic tool, which categorizes symptoms into cognitive, physiological, behavioral, and affective types. Examples of cognitive symptoms include losing control, frightening thoughts, images or memories, and confusion (Chand & Marwaha, 2025). Physiological symptoms include fast heart rate, strong heartbeat, breathing difficult, dizziness, sweating, shivers, diarrhea, and shaking. Behavioral symptoms include escape, restlessness, agitation, immobility, and flight, while affective symptoms include nervousness, fear, terror, and

jitteriness. The causes of anxiety can include medications (including herbal supplements), substance abuse, trauma (including childhood trauma), and panic disorders. Dr. Chand and Marwaha (2025) also listed and defined nine types of anxiety based on the DSM-5 tool. The first type is separation anxiety, which involves fear and anxiety related to the loss or separation from a loved one. This often begins in childhood and may continue into adulthood. The next type is specific phobia, where anxiety arises from encountering specific objects or situations that trigger fear. Individuals with social anxiety often experience a fear of judgment or ejection in social contexts. Panic anxiety is marked by sudden or anticipated anxiety, with symptoms like sweating, shortness of breath, and intense fear. Agoraphobia is the fear of being in crowded places, open spaces, enclosed spaces, or outside the home. Generalized anxiety describes individuals with constant worry about many things of life, such as working environments and family life, which can cause fatigue and trouble sleeping. Finally, anxiety due to other medical conditions or illnesses is often ruled out first by using tests like blood tests and scans. The display of anxiety symptoms is diverse, and despite treatment with medications, the rate of recurrence remains high (Chand & Marwaha, 2025).

Based on expert opinions and research on the definition of anxiety, the author of this project believes anxiety as a trigger for both physiological and psychological responses that activate the body's defense mechanism, causing tension and fear in anticipation of a possible threat or harm. This can disrupt daily activities, shifting the mind from a healthy, balanced state into one dominated by fear. Therefore, as Hanson and Mendius (2009) suggest, anxiety can be understood as a form of negative energy. Anxiety can vary in severity and appears in different ways, affecting a person's daily life. Uniquely, it involves both external stimuli and internal thoughts or, in some cases, can occur without any external triggers (Hanson & Mendius, 2009).

This causes the body to react as if it were in a state of stress, preparing for fight or flight consistently. Dr. Chand (Chand & Marwaha, 2025) explained that long-term anxiety can lead to serious health issues, including heart problems, lower quality of life, and even suicidal thoughts. Lastly, it is hope that this project shows that anxiety is a complex response that affects both the mind and body.

2.2 Medications Literatures

This first section will focus on common medication classes are commonly used in the United States to treat anxiety, followed by a discussion of the studies supporting the role of mindfulness. Borwin Bandelow is a German doctor specializing in psychotherapy and neurology, with a focus on anxiety disorders and depression. He has published over 365 works, including books and journal articles, and was ranked among the top 500 intellectuals in Germany (Dr. Borwin Bandelow - PSY | Ekademeia, n.d.). Borwin Bandelow et al. (2017) noted that anxiety is often treated when it causes significant distress and impairs quality of life. Medications for anxiety have shown positive benefits in managing anxiety disorders but not recommended for routine treatment due to its side effects and limitation on the duration and not efficacious for all types of anxiety (Bandelow et al., 2017). There are more than four drugs classes use to treat anxiety but only four mainly used and first line options are addressed in this project. Specifically, this section will cover four commonly used medication classes: selective serotonin reuptake inhibitors (SSRIs), serotonin-norepinephrine reuptake inhibitors (SNRIs), tricyclic antidepressants (TCAs), and benzodiazepines (BZDs). SSRIs work by preventing the serotonin transporter (SERT) from removing serotonin from the bloodstream, leading to increased serotonin activity (Borwin Bandelow et al.,2017). Balanced serotonin levels help regulate emotions, contributing to feelings of happiness, calmness, improved sleep, bone health,

sexual health, and even wound healing (*Serotonin: What Is It, Function & Levels*, n.d.). SNRIs mainly prevent the reentry of serotonin back into the neurons, and to a lesser extent, they also block the reuptake of norepinephrine (Melaragno, 2021). This leads to an increase in both serotonin and norepinephrine levels through the action of SNRIs. Norepinephrine's roles are related in enhancing memory, alertness, energy, and the regulation of emotions (Zoppi, 2019). The TCA class of drugs prevents the reabsorption of serotonin and norepinephrine, which bears resemblance to the mechanism utilized by serotonin-norepinephrine reuptake inhibitors (SNRIs). This lack of selectivity leads to a higher likelihood of side effects (Purse, 2022). Finally, benzodiazepines boost the effects of gamma-aminobutyric acid (GABA), producing a tranquillizing effect by decrease excessive stimulation in brain activity (Carter, 2020). The choice of selection based on the user's condition, cost, tolerability.

Bandelow et al.'s (2017) treatment recommendations for anxiety were grounded in a meta-analysis and a review of an earlier study he conducted with a different research team in 2015. The 2017 the meta-analysis was conducted in Germany by Borwin Bandelow and his team, including Sophie Michaelis and Dirk Wedekind, from the Department of Psychiatry at Gottingen University Medical Center. He recommended anxiety should approach utilized medicines, psychotherapy and other interventions due to different level and types of anxiety disorders. He found that the current medications are more effective treating GAD, PAD and SAD than other types of anxiety (Bandelow et al., 2017). SSRIs and SNRIs are considered first choice treatments, while benzodiazepines are used for short-term and TCAs for second-line treatment (Bandelow et al., 2015) (Bandelow et al., 2017). This recommendation was supported by Thibaut's (2017) literature review, which utilized Borwin Bandelow's et al. (2017) meta-analysis and 234 randomized trial studies (Thibaut, 2017). In the SSRI group, only

Escitalopram, Paroxetine, and Sertraline are effective for all three types of anxiety, while other SSRIs are specifically effective for just one type. In the SNRI group, only Venlafaxine is effective for treating all three anxiety types. In the TCA group, Clomipramine is the only drug proven effective, but it is suitable only for treating panic disorder with agoraphobia (PDA), while other TCAs are still used for anxiety despite limited evidence (Bandelow et al., 2017).

Bandelow et al. (2017) also noted that several adverse effects of SSRIs are typically more intense during the first two weeks of treatment, although it may take 2 to 6 weeks to observe their full efficacy. However, a potential risk associated with SSRIs is serotonin syndrome, a medical emergency that can result from an overdose (Chu & Wadhwa, 2025). If a patient cannot tolerate one drug class, they may be switched to another due to variations in side effect intensity. Although Bandelow et al. (2017) highlighted the effectiveness of TCAs, they are suggested only as a secondary treatment because of the risk of a potentially fatal overdose. Benzodiazepines, while effective, have adverse events such as depression, cognitive impairment in the elderly, and dizziness. These treatments are avoided as first-line options due to the risk of suicidal thoughts and withdrawal symptoms (Bandelow et al., 2017a). While all of these drug groups have been shown to be effective for anxiety, clinical trials have only been conducted for up to 12 months, so data on their long-term use remains unknown (Bandelow et al., 2017a). Relapse rates are frequent once these medications are discontinued. Additionally, these drugs interact with others, increasing the likelihood of side effects. All of these medications also carry potential severe adverse effects, drug interactions, and require dose adjustments for kidney or liver function, as well as posing potential risks to the fetus (Bandelow et al., 2017a). These factors will not be discussed in detail. These recommendations and potential side effects of the drugs are counseled to patients at the author's current workplace. Additionally, these drug classes are FDA-approved

for treating some or all types of anxiety. The advantages and possible drawbacks should be thoroughly considered by doctors, with attention to the seriousness of the condition and the patient's general health.

In 2020, Amir Garakani and his team conducted an analysis review on current and emerging anxiety treatments (Garakani et al., 2020). Garakani, a psychiatrist, the head of the Department of Psychiatry at the School of Medicine in New York, collaborated with colleagues from Yale School of Medicine, all specializing in psychiatric research. The review highlighted that the literature suggested only 60-85% of patients respond to medications, but only 50% achieved full recovery, while others either failed to respond or experienced relapse (Garakani et al., 2020). Selective serotonin reuptake inhibitors (SSRIs) and serotonin-norepinephrine reuptake inhibitors (SNRIs) are considered the most effective treatments for panic disorder (PD), social anxiety disorder (SAD), and generalized anxiety disorder (GAD), with some also being used off-label. These medications are generally well-tolerated due to their relatively mild side effects. In comparison, tricyclic antidepressants (TCAs) are effective for PD, GAD, and SAD but are less use due to side effects such as weight gain, irregular heartbeats, sedation, and the risk of fatal overdose (Garakani et al., 2020). Benzodiazepines have long been a treatment option for PD, GAD, and SAD. However, their use is limited by the high potential for dependence and the increased risk of falls, particularly in older adults. Other drug classes, while occasionally used, are less common due to limited clinical trial data or intolerable side effects. These include monoamine oxidase inhibitors (MAOIs), mirtazapine, GABAergic agents, antipsychotics, beta-blockers, antihistamines, and anxiolytics (Garakani et al., 2020). Garakani et al. (2020) highlighted in his review that while medications do not address the full spectrum of anxiety disorders, their effectiveness in short-term treatment is undeniable. While they may not provide

a comprehensive solution for all types of anxiety, these medications have shown significant efficacy in alleviating symptoms in the short term (Garakani et al., 2020).

According to Frank J. Farach (et al., 2012), PhD in psychology, there is a noticeable lack of data regarding the long-term efficacy of pharmacological treatments for anxiety. This gap has led to the use of drug combinations across different classes as a treatment approach. Research shows that SSRIs and SNRIs are often the primary choice for anxiety treatments. They help by preventing the reuptake of serotonin and norepinephrine, which primarily boosts serotonin levels and helps balance norepinephrine in the brain. However, these drugs are not typically the first choice in phobic anxiety. SSRIs and SNRIs are effective treatments for anxiety, offering relatively lesser side effects and a low risk of abuse, which makes them generally well-tolerated by patients. However, Farach et al.(2012) mentioned about 30-50% of patients may have mild side effects. Mild refers to a tolerable level, but he did not elaborate further on the details. It usually takes 2-6 weeks to see an initial 25% improvement, and full efficacy can take 6 weeks or more. One concern with these medications is the potential for suicidal thoughts or behavior in individuals aged 24 and younger. Non-responders may be due to non-adherence to the treatment or medication resistance (Farach et al., 2012).

Farach et al.(2012) also mentioned that Tricyclic antidepressants (TCAs) have proven to be equally effective as SSRIs in treating panic disorder and generalized anxiety, but they come with a higher risk of fatal overdose. TCAs also have more intolerable side effects, such as fast heart rate, blurred vision, and irregular heartbeat. Monoamine oxidase inhibitors (MAOIs) are considered only when the benefits outweigh the risks. These drugs have serious interactions with certain foods and other medications, such as those containing tyramine (e.g., cheese or beer), so they are rarely used for anxiety (Farach et al.,2012). Other medications like

Mirtazapine, Bupropion, Trazodone, and Nefazodone have been studied as adjunct treatments but are not commonly used. Benzodiazepines work by binding to the GABA-A receptor, increasing the presence of GABA in the brain, which reduces brain activity, creating a calming and muscle-relaxing effect (Farach et al..2012). While they act quickly, they are intended for short-term use as they do not provide lasting relief and can lead to dependence, drug abuse, and cognitive and motor skill impairments with long-term use. In general, while combining medication with psychotherapy is considered a very effective treatment approach, it is also worth noting that medication alone can be a favorable choice for many individuals seeking relief from anxiety (Farach et al., 2012).

Suma Chan is a PhD Professor and Director of the Cognitive Behavior Therapy (CBT) and Psychiatrist Raman Marwaha created the overview aspects of anxiety in 2025. For treatment of medications, SSRI and SNRI are equally effective as first line treatment. SSRI mentioned are Fluoxetine, Sertraline, Paroxetine, Escitalopram, and Citalopram. The SNRI are Venlafaxine and Duloxetine. The group TCA is effective but often not use due to high events of side effects. The medication in this group includes: Amitriptyline, Imipramine and Nortriptyline. Benzodiazepines are only for short term. They works within 1 hour therefore it is often use for fast-reliever in panic attacks, but it has dependence in the long run. Other drugs from different classes, such as Buspirone, Propranolol, and Atenolol, are sometimes used for certain types of anxiety, though not all, and their use for this purpose is considered off-label. Additionally, psychotherapy has been helpful for managing anxiety in stressful situations (Chand & Marwaha, 2025).

Based on these above studies: Bandelow et al., 2017, Garakani et al., 2020, Farach et al., 2012, Chand & Marwaha, 2025, the author of this project believes that these medications have

demonstrated efficaccy in treating anxiety, although long-term benefits have not been extensively researched. There is long-term studies of medication used to treat anxiety is an area that needs to be studied further. Common unfavorable effects of these medications include nausea and dizziness, and it often takes a few weeks to observe their effectiveness. The first-line treatments widely agreed upon are SSRIs (Selective Serotonin Reuptake Inhibitors) and SNRIs (Serotonin-Norepinephrine Reuptake Inhibitors). While TCAs (Tricyclic Antidepressants) and Benzodiazepines are well-known, they are not often used as standalone treatments due to a higher risk of adverse effects. All current medications for anxiety come with potential side effects, including concerns related to pregnancy, kidney, and liver function. Interestingly, most of these drugs are marketed primarily for depression, with their use for anxiety being considered off-label. Despite this, there are clinical trials actively studying the effectiveness of these drugs for anxiety as shown above.

2.3 Mindfulness Based Intervention Literatures

In this section, the definitions of mindfulness will be explored. The American Psychological Association (2015) reported that more than 200 studies have highlighted mindfulness therapy as effective in lowering levels of anxiety, stress, and depression, while also preventing relapse. Mindfulness meditation impacts brain activities related to attention and emotional regulation, helping to reduce negative reactions and general worries in daily life. Today, mindfulness is available in clinics, online platforms, and through mobile apps (*Mindfulness Meditation*, 2015). There are several types of mindfulness practices, with many studies focusing on two main approaches: Mindfulness-Based Stress Reduction (MBSR) and Mindfulness-Based Cognitive Therapy (MBCT) (*Mindfulness Meditation*, n.d.). MBSR is a meditation practice that can be done individually or in a group setting. MBCT blends

mindfulness practices with Cognitive Behavioral Therapy (CBT), which aims to reshape negative thought patterns and behaviors associated with the condition (Kazantzis, 2024). The author of this project does not aim to promote any existing therapeutic approach. Instead, the goal is to present mindful breathing as a distinct treatment—an additional form of mindfulness-based intervention. Unlike established programs such as Mindfulness-Based Stress Reduction (MBSR) and Mindfulness-Based Cognitive Therapy (MBCT), which often incorporate awareness of bodily sensations or cognitive acceptance alongside mindful breathing, this project focuses solely on mindful breathing as the central practice. .

Christopher Germer, PhD in psychology, is an expert in mindfulness and self-compassion research, particularly in psychotherapy. He has taught mindfulness to over 250,000 people worldwide.(*About | Learning to Be Self-Compassionate | Chris Germer*, 2004). In an article defining mindfulness, Christopher Germer (2004) remarked mindfulness is a cultivated skill, enabling individuals to recognize and remain calm in the face of various situations. It serves as a way to lessen the suffering caused by negative sensations as they arise. For instance, being unmindful may manifest as spilling something, rushing through tasks, or failing to notice uncomfortable feelings (Germer,2004). Mindfulness, originally discovered in Buddhist psychology over 2,500 years ago, has many definitions. A common understanding of mindfulness is that it entails a non-judgmental state of mind; however, it is generally defined by alert and center attention on the present moment. Practicing mindfulness helps individuals control their emotional and physical reactions to situations (Germer,2004). The practice can be as simple as taking a few seconds to breathe before making the next move, or for those more experienced, it can involve sitting for hours in observation, as monks and nuns often do. Germer (2004) noted that seasoned meditators experience qualities such as non-judgment, intentionality,

non-verbal awareness, the liberation of conditioned suffering, and a deeper understanding of perception. Mindfulness helps individuals recognize the source of their suffering and understand the impermanence of all things (*About | Learning to Be Self-Compassionate | Chris Germer*, n.d.). In 1995, Mark Epstein introduced Buddhist psychology to Western clinicians, initially focusing on transcendental meditation. However, it was in the 1990s that Jon Kabat-Zinn promoted mindfulness, which gained widespread acceptance and became a new trend in psychology. While the intellectual and behavioral aspects of mindfulness are still being explored, its impact on mental health is becoming increasingly recognized .

In a study led by Dr. Elizabeth Hoge, a Ph.D. psychologist, and eight other researchers, the rise of mindfulness meditation as a treatment for anxiety disorders was explored (Hoge et al., 2013). The research included 93 individuals over an 8-week period. The results indicated that mindfulness-based interventions alone significantly reduced anxiety. Hoge et al. (2013)highlighted that this method is cost-effective and easily accessible. Mindfulness involves being fully aware of the present moment, helping practitioners develop a calm attitude toward their thoughts, emotions, and experiences (Hoge et al., 2013).

In the article *Mindfulness Meditation: A research-proven way to reduce stress,* the American Psychological Association (2015) defined mindfulness as a type of meditation that fosters both awareness (attention) and acceptance. The "attention" phase focuses on staying present, without distractions. Typically, this is practiced by concentrating on one's breath, thoughts, or bodily sensations in the moment. "Acceptance" refers to observing feelings as they arise without reacting to them—simply acknowledging them and letting them pass without assigning any negative or positive judgment (*Mindfulness Meditation*, 2015).

In the article *Mindfulness in Psychotherapy: An Introduction*, Chris Mace, a consultant psychologist, loosely defines mindfulness as "bare attention," (Mace, 2007) which refers to a state of awareness without judgment or distraction, focused on the "immediate present" (Mace, 2007). Without practice, the mind tends to wander quickly, often without us even noticing. Practicing mindfulness meditation consistently is essential for gaining its benefits, as those who engage in it regularly often notice improvements more quickly. Mace (2007) noted that research has shown mindfulness can increase positivity in brain waves. There are several techniques that can be applied and practiced at any time of day. He explained that mindfulness comes from Buddhism but is now used in therapy as a tool, without the religious aspects. A common link between Western cognitive psychology and Eastern Buddhist psychology is the focus on transforming thought and perception patterns in individuals with emotional imbalances. Examples of individuals who can benefit from mindfulness include those suffering from anxiety, depression, self-harm, violence, and self-hatred. Mindfulness has been proven to bring significant benefits to mental health (Mace, 2007).

Based on these findings, the author of this project concurs that mindfulness, as taught in the Buddhist tradition, is the cultivation of awareness of the ever-changing mental states, developed through focused attention on a chosen object—such as the breath—without distraction or judgment. Mindfulness is the ability to witness the arising of anxiety and fear without clinging to them, and to gently shift one's focus away from these emotions to the breath. In this practice, one is not reacting to the fear but observing it with equanimity, thus transforming it into an object of awareness. By redirecting the mind’s attention and observing fear without attachment or aversion, the individual prevents the mind from fixating on the perceived threat (Germer,2004). This shift in concentration allows the practitioner to enter a state of mental

clarity, free from the entanglements of fear. In the Western psychological context, mindfulness has also been shown to provide profound benefits, positively influencing brain chemistry, enhancing emotional regulation, and deepening the effectiveness of psychotherapy.

2.4 Buddhist Source Texts and Commentaries Literature

This section will start with a look at the Buddhist original source texts, followed by Buddhist commentaries. The main traditional texts discussed will be the Ānāpānassatisutta and the Mahāsatipaṭṭhāna Sutta. These will be supported by insights from Bikkhu Sujato, Ven. Thich Nhat Hanh, S.N. Goenka, Bhikkhu Buddhadasa, and Bikkhu Thanissaro .

The Ānāpānassatisutta (Mindfulness of Breathing), translated into English by Bhikkhu Sujato (n.d.). Bhikkhu Sujato, ordained as a monk in 1994 in the Ajahn Chah lineage, has translated numerous early Buddhist texts from Pāli into English and established the website Suttacentral.net. In this sutta, the Buddha, while in Sāvatthī, teaches his disciples about the benefits of cultivating mindfulness of breathing. He emphasizes the importance of sitting in a proper posture and concentrating on the breath. The Ānāpānassatisutta outlines 16 steps of breathing techniques that lead to bliss by letting go and recognizing the impermanence of the breath, which in turn fosters awareness of the impermanence of experiences in both body and mind (Bhikkhu Sujato, n.d.). It is mentioned that the practice should be done in a seated position at a quiet place (Harvey et al., 2017). Thich Nhat Hanh (Thich Nhat Hanh, 2021) has summarized these 16 steps as follows:

1. Observe the long breath.
2. Observe the short breath.
3. Be aware of the whole body while breathing.
4. Be aware of the calming of the body.

5. Be aware of joy.
6. Be aware of happiness.
7. Be aware of mental formations.
8. Be aware of calming mental formations.
9. Be aware of the mind.
10. Be aware that my mind is happy.
11. Be aware that I can make my mind happy.
12. Experience the liberation of the mind.
13. Observe the nature of all dharmas.
14. Observe the vanishing of desire..
15. Observe the nature of all phenomena as being free from birth and death.
16. Observe detach of everything (N.Thich, 2021)

In the book *Anapanasati*, Buddhadasa Bhikkhu (1976) mentions that mindfulness breathing leads to happiness, divine wisdom, clear awareness, and the cessation of afflictions. Out of deep respect and faith, an individual practices with a pure mind, recognizing that it is a requirement for genuine progress. Insight arises through meditation, and through that insight, inner defilements can be gradually eliminated. He mentioned the 16 breathing steps discussed in *Anapanasati* have been an integral part of Buddhist practice since the beginning of Buddhism, helping practitioners develop mindfulness and concentration. Buddhadasa (1976) divided these steps into 4 tetrads, each corresponding to one of the 4 types of mindfulness in Vipassana practice. The first tetrad focuses on body awareness, the second on awareness of sensations, the third on mindfulness of the mind, and the fourth on awareness of mental objects. Steps 1 to 4 make up the first tetrad, steps 5 to 8 the second, steps 9 to 12 the third, and steps 13 to 16 the

fourth (Buddhadasa, 1976, p.68). He taught that " object of calming is mindfulness of breathing" (Buddhadasa, 1976, p.68). This exploration will focus solely on the first tetrad, steps 1 to 4 of the 16 exercises, which are particularly effective in calming the body, especially for those experiencing anxiety. Anxiety disrupts the balance between the body and breath, and these steps help restore that balance, preventing future anxiety from reoccurring. The remaining steps will not be discussed in this project. Buddhadasa (1976) taught step 1 involves observing the breath as it enters the body, taking note of the length of each inhale. Step 2 is about observing the breath as it exits the body, paying attention to whether the exhale is short or long. Step 3 requires awareness of the entire body as it breathes in and out. Step 4 involves recognizing the calming effect on the body as the breath flows in and out. To practice effectively, practitioners should sit in a relax position with eyes either open or closed, ensuring proper airflow. Meditation has numerous benefits, including happiness, insight, and liberation. By engaging in mindful breathing, practitioners can cultivate a sense of peace and emotional balance, leading to a deeper understanding of the present moment (Buddhadasa, 1976).

The Mahāsatipaṭṭhāna Sutta (The Longer Discourse on Mindfulness Meditation) was translated into English by Bhikkhu Sujato (n.d.). It is primarily focused on the Four Foundations of Mindfulness, it also summarizes the 16-step mindfulness of breathing practice, which is presented as one of six types of meditation on the body is primarily focused on the Four Foundations of Mindfulness, it also summarizes the 16-step mindfulness of breathing practice, which is presented as one of six types of meditation on the body. The goal of this practice is to gain insight and detach from afflictions (Bhikkhu Sujato, n.d.). The Buddha also taught the importance of finding a peaceful and quiet place for meditation, using examples such as going to the wilderness or sitting at the root of a tree (Bhikkhu Sujato, n.d.). The Satipatthana Sutta (The

Foundation of Mindfulness) is a shorter version of the Mahāsatipaṭṭhāna Sutta, both of which explain the four foundations of mindfulness: body, feeling, consciousness, and mental objects. In both Suttas Soma Thera (1998) mentioned the meditation on the body is divided into six parts: 1. mindful breathing, 2. observing the body's movement while walking, sitting, lying down, and standing, 3. clear knowing in daily activities, 4. reflecting on the body's elements and impurity from head to toe, 5. contemplating the four elements that make up the body, and 6. reflecting on the nine stages of decay. For this discussion, the focus is on the first part of Soma Thera's (1998) commentary, mindfulness of breathing. He outlined the first four steps of the 16-step mindfulness of breathing practice. While practicing, one begins by becoming aware of both inhalation and exhalation, first recognizing when the breath is long. The second step is to notice when the breath is short, maintaining mindful attention throughout. The third step involves focusing on the entire body breathing as the breath goes in and out. This leads to the fourth step—contemplating the calming effect of the breath, which in turn brings a sense of relaxation to the body. Through this practice, the body is understood as a vessel for mindfulness, gradually becoming detached from worldly distractions and afflictions (Soma Thera, 1998).

The extended application of mindful breathing continues to evolve, especially in its role within psychological and therapeutic practices. Currently, the S.N. Goenka Institute promotes Vipassana meditation by holding numerous retreats for both children and adults. S.N. Goenka, an Indian Buddhist influenced by the Ledi Sayadaw tradition through his teacher U Ba Khin, established the Vipassana Institute in 1985 (Sharon Salzberg, 2013). He had written over 50 books on Dharma and Vipassana. His mission was to help transform the mind by eliminating anger, hatred, passion, fear, and other impurities . Goenka & Hart (2000) taught that breathing is a natural bodily process that can become unsteady or rapid in response to negative thoughts or

emotions. By focusing on the breath, the mind can regain concentration and eventually lead to deeper insights through Vipassana practice. One of the books used to guide Vipassana practice is Discourse Summaries. In this book, Goenka & Hart (2000) explained that practitioners begin by focusing on their breath. As practitioners do so, they become aware of how the breath transitions from coarse to fine, and eventually becomes subtler. This process helps practitioners gain deeper insight into the functioning of the body, and ultimately, the mind. When the breath becomes softer, it signifies that impurities have been released (Goenka & Hart, 2000). Learners who have completed the course have reported improved awareness, reduced anxiety and fear, increased confidence, and an overall sense of well-being.

Bhikkhu Thanissaro's (n.d.) commentary in *Mindfulness of Breathing***,** part one of his eBook available on the Dhammatalks website. Bhikkhu Thanissaro (n.d.) explained that the 16 exercises outlined in the Ānāpānasati Sutta are designed to highlight the link between the mind and the body. These exercises are divided into four sets: techniques focused on the body, feelings, mind, and mental qualities, with the ultimate goal being liberation. The process involves focusing the mind, which Bhikkhu Thanissaro refers to as "calming the mind," (Thanissaro, n.d.) in order to develop insight and tranquility. The breath serves as a tool to understand the mind. Self-understanding, through mindful breathing, can be very beneficial in life. Breathing often acts as an anchor point in this practice. The first step is to become aware of the body and the breath, observing its natural rhythm as it moves in and out, focusing on the long and short inhales and exhales. The second step is to connect the feelings with the breath. The first and second steps are important because the energy created through these practices must start off coarse before gradually refining it over time. He emphasized that the breath is a form of energy, and when it flows smoothly, it brings balance to the entire body. In more advanced

stages, one may feel as though each cell is breathing, and experience a sense of wind moving through the space of the cells, circulating throughout the body (Thanissaro Bhikkhu, n.d.).

In another book *Meditations,* Bhikkhu Thanissaro stated that "right mindfulness is having the right frame of reference for dealing with pain or pleasure" (Thanissaro Bhikkhu, 2013, p. 50). He taught the importance of detaching from attachments to likes and dislikes when faced with pleasant or unpleasant situations. Attention to the breath can be pleasant or unpleasant at times, but in such moments, an individual can change their perception of the breath—whether shallow, fast, slow, broad, or narrow. Furthermore, the breath can be observed as it absorbs into the body as it comes and goes. The right technique is whichever one allows you to feel comfortable. If a negative thought arises, simply let it go and transform it into something humorous (Thanissaro Bhikkhu, 2013). If you become distracted, calmly return your focus attention to the present moment. By maintaining a relaxed, comfortable state within the breath, you enhance a sense of pleasure and focus. Changing the frame of reference in meditation helps you develop new attitudes towards fear or sensations of pain. Meditation is not about suppressing fear or negative perceptions, but rather about increasing your awareness and the ability to transform those fears (Thanissaro Bhikkhu, 2013). This is a more intelligent way to deal with emotions—by not suppressing them, but acknowledging and shifting them. Bhikkhu Thanissaro (2013) reminded practitioners not to push themselves to the point of snapping. One must balance the amount of energy and time spent, based on their own ability (Thanissaro Bhikkhu, 2013). This book presents different ways to deal with some difficulties during breathing meditation and ways to transform the perception to overcome the fear.

Anxiety, a form of mental negativity, leads to suffering and reduces quality of life (Hanson & Mendius, 2009). Anxiety arises from mental afflictions, giving rise to fear,

avoidance, and a strong urge to escape—placing the mind in a survival mode (Hanson & Mendius, 2009). This reactive state is driven by deep-seated discomfort, where the individual seeks relief by fleeing rather than facing the root cause. Calmness brings clarity, and meditation fosters this clarity, allowing practitioners to experience joy through mental insight (N. Thich, 2006). Therefore, anxiety cannot be seen as a positive state, as it does not lead to calm, clarity and joy. Anxiety is not a neutral state because it involves a clear reaction of aversion or dislike. In Buddhist terms, a neutral state of mind is free from both craving (liking) and aversion (disliking). However, anxiety is driven by discomfort and resistance, making it an unbalanced, reactive state rather than a calm or impartial one. The author of this project aims to demonstrate that Buddhist breathing meditation, passed down for over 2,500 years as a foundation for cultivating equanimity and liberation, can be applied to modern medical treatment. The Ānāpānassatisutta and the Mahāsatipaṭṭhāna Sutta offer valuable ancient guidance on breathing meditation and should be studied and explored as effective tools for restoring balance and bringing calm to both body and mind. Mindful breathing, as outlined in the first four steps of the Anapanasati Sutta (Buddhadasa, 1976), is both an act of concentration and contemplation. Through deep focus on the breath, such as counting each inhalation and exhalation, the mind can gradually let go of fear, bringing the individual into the present moment. When fear loses its momentum and cannot continue its cycle, the mind remains calm, creating space for contemplation. In that stillness, the root of the fear can be observed, and the practitioner is able to discern its impermanent nature, recognizing that all phenomena, including fear, arise and pass away. By calming the mind, the body will gradually follow. With regular practice, this harmony leads to improved emotional regulation, easing anxiety and allowing us to face fear with greater calm and clarity.

CHAPTER 3: METHODOLOGY AND METHODS

3.1 Types of methods

This project will incorporate both mixed-method and non-mixed-method studies, combining a literary analysis of source texts and commentaries with a pharmacological research of anxiety treatments. Mixed method approach is often utilized two sets of data that are collected to answer or evaluated the same problem. For example the project evaluate the effectiveness and implementation. A mixed-method approach combines both qualitative and quantitative research. Quantitative methods typically focus on collecting data and numerical values, while qualitative methods provide deeper insights and analysis of the data (Dawadi et al., 2021). The quantitative data referenced in this section pertain to the four medications discussed in Section 3.2 of this project.

The qualitative sources include several key studies and texts as follow: *Neurobiological Changes Induced by Mindfulness and Meditation: A Systematic Review* by Andrea Calderone et al. (2024), *Mindfulness in Psychotherapy: An Introduction* by Chris Mace, *Effect of Mindfulness Breathing Meditation on Depression, Anxiety, and Stress: A Randomized Controlled Trial among University Students* by Maria Komariah, *Satipatthana Sutta* by Soma Thera (1998), and *Abhidharmakosabhasyam* Volume III, translated by Sanchali Bedi (2020).

The studies with mixed method are *The Effectiveness of Mindfulness-Based Interventions on Anxiety Disorders. A Systematic Meta-Review* by Ascenio Fumero et al. (2020), *Randomized Controlled Trial of Mindfulness Meditation for Generalized Anxiety Disorder: Effects on Anxiety and Stress Reactivity* by Elizabeth Hoge et al. (2013), *Mindfulness-Based Stress Reduction vs Escitalopram for the Treatment of Adults With Anxiety Disorders: A Randomized Clinical Trial* by Elizabeth Hoge et al. (2023), *10 Day Courses* guided by S.N. Goenka, and *The Miracle of Mindfulness* by Ven. Thich Nhat Hanh (1987).

3.2 Specific Medications Research

To diagnose anxiety disorders accurately, healthcare professionals commonly utilize various tools and scales. Common diagnostic instruments include the Generalized Anxiety Disorder Scale (GAD-7), the Diagnostic and Statistical Manual of Mental Disorders (DSM), the Clinical Global Impression Severity Scale (CGI-S), and the Hamilton Anxiety Rating Scale (HAM). The GAD-7 categorizes anxiety levels based on responses to a series of questions, providing a scoring system as follows: 0-4 indicates minimal anxiety, 5-9 indicates mild anxiety, 10-14 indicates moderate anxiety, and a score greater than 15 indicates severe anxiety(What Are Anxiety Disorders?, n.d.). DSM, now in its latest version DSM-5-TR, serves as a comprehensive reference guide for identifying mental health disorders and brain-related issues. Additionally, the Clinical Global Impression Severity scale, CGI-S, offers clinicians a structured set of questions to assess severity, while the HAM evaluates the severity of anxiety through mental and psychological questionnaires specifically designed for patients (*How the Hamilton Anxiety Scale Is Used*, n.d.) (Busner & Targum, 2007).Additionally, the International Statistical Classification of Diseases and Health Related Problems (ICD) use to diagnose for mixed-anxiety and depression which are excluded from DSM testing (Bandelow et al., 2017a). Overall, all clinical trials and research require a set of guidelines or tools to diagnose, monitor, and assess the progress and outcomes.

This upcoming section will discuss one drug from each of the four main medication classes—SSRI, SNRI, TCA, and Benzodiazepine—along with clinical trial data. Within the first-line SSRI class, Escitalopram will be used as an example, as it has shown effectiveness for GAD, PAD, and SAD as off-label. Escitalopram blocks the reuptake of serotonin thus increases serotonin level in the brain space. It was marketed in 2002. Its efficacy was demonstrated in a

clinical trial involving three 8-week phases, with 715 participants receiving a placebo and 592 receiving Escitalopram. The participants' age range was 18 to 65 years (*Lexapro (Escitalopram Oxalate)*, n.d.). Approximately 6% of participants discontinued Lexapro due to side effects, with more than 5% experiencing insomnia, nausea, and dry mouth (*Lexapro (Escitalopram Oxalate)*, n.d.). Other common side effects include jitteriness, restlessness, weight gain, sexual dysfunction, and, rarely, suicidal thoughts (Bandelow et al., 2017a). The Hamilton Anxiety Scale (HAM-A) was used to assess the efficacy of the treatment outcomes for anxiety, and the DSM-IV served as the diagnostic tool. The package insert for Escitalopram indicates its use in treating Generalized Anxiety Disorder (GAD), while it is also commonly prescribed off-label for other types of anxiety disorders. The medication is available in 5mg, 10mg, and 20mg tablet doses, with a recommended once-daily frequency. The dose may be increased after one week, as needed. Escitalopram maximum dose is 20mg a day. It is advised to maintain the least effective dose and to regularly assess the therapy. The medication reaches its peak concentration within 5 hours, and it takes approximately 135 to 160 hours for it to be fully eliminated from an adult body. Patients typically begin to notice improvements within 1 to 6 weeks, although in some cases, it may take longer. Additionally, the medication carries a black box warning regarding suicidal thoughts, along with a list of potential side effects and precautions (*Lexapro (Escitalopram) Dosing, Indications, Interactions, Adverse Effects, and More*, n.d.) .

For the SNRI class, Venlafaxine will be used as an example. Venlafaxine increases serotonin and norepinephrine level in the brain. The package insert includes a "black box warning," which highlights major concerns that users should be aware of. Specifically, this warning indicates a higher risk of suicidal thoughts in young adults, a common risk shared by other medications in this class. Venlafaxine is used to treat GAD, PAD, SAD, and major

depressive disorder as off-label. It was marketed in 1993. Its efficacy was demonstrated in five 6-week trials involving 1,382 participants (*Effexor®(Venlafaxine Hydrochloride)Tablets*, n.d.). The DSM-III or DSM-III-R was used for diagnostic measurement, and outcomes were assessed using the Hamilton Depression Rating Scale and the Clinical Global Impression-Severity of Illness. A 52-week follow-up study, which included participants who experienced relapse, was conducted. Common side effects of Venlafaxine include dizziness, fatigue, restlessness, agitation, panic attacks, and more severe issues like mania, serotonin syndrome, raised intraocular pressure, and abnormal bleeding (*Effexor®(Venlafaxine Hydrochloride)Tablets*, n.d.). There is also a potential risk for pregnant individuals. Doses need to be change for patients with dysfunction renal (kidney) or hepatic (liver). The clinical trials only assessed efficacy up to 6 months, so for longer treatment durations, doctors must periodically reevaluate patients. The package insert lists the medication's indications for the treatment of Generalized Anxiety Disorder (GAD), Social Anxiety (SA), and Panic Anxiety Disorder (PAD). Additionally, it is commonly used off-label to treat other anxiety disorders. The medication is available in tablet formulations of 25mg, 37.5mg, 50mg, 75mg, 100mg, 150mg, 225mg, and 112.5mg. It is typically taken once a day, with a recommended wait time of 4 to 7 days before increasing the dose, with a maximum daily dose of 225mg. For individuals with poor liver or kidney function, the dose should be adjusted to a lower milligram level. The medication has over 20 potential drug-drug interactions and more than 20 possible side effects. It carries a black box warning regarding suicidal thoughts. Pregnant women should exercise caution when using this medication. It takes 3 to 9 hours to reach its optimal effect, and it is fully eliminated from the adult body within 25 to 55 hours. Patients typically begin to notice improvements within 1 to 6

weeks, although in some cases, it may take longer (*Effexor XR, Venbysi XR (Venlafaxine) Dosing, Indications, Interactions, Adverse Effects, and More*, n.d.).

TCAs boost the levels of specific brain chemicals, including serotonin and norepinephrine, which are involved in regulating mood and emotions. First original clinical trial conducted by R.J. Ellison and L.A. Cancellaro in 1978, which involved 60 patients with anxiety over a four-week period. Result had shown 50% improvement than of placebo (Ellison & Cancellaro, 1978). The data suggests a clear therapeutic benefit, demonstrating that the intervention was likely useful for anxiety relief, at least within the context of this short-term trial. The drug in this group is FDA-approved for depression and used off-label for anxiety. As for the TCA group, Amitriptyline is chosen as the example. It was marketed in 1961. The medication is available in tablet formulations of 10mg, 25mg, 50mg, 75mg, 100mg, and 150mg (*Levate (Amitriptyline), Dosing, Indications, Interactions, Adverse Effects, and More*, n.d.). It is usually taken once a day, but in some cases, the dose can be divided, with a maximum daily limit of 400 mg. It is primarily used off-label and has several drug interactions with other medications. The drug also carries a list of potential side effects such as dizziness, blurred vision, headache, irregular heartbeat, dry mouth, confusion, hallucination and a black box warning for suicidal thoughts. It takes approximately 4 hours to reach its maximum effect, and it is fully eliminated from the adult body within 45 to 135 hours. It usually takes 1 to 2 weeks for patients to notice improvement (*Levate (Amitriptyline), Dosing, Indications, Interactions, Adverse Effects, and More*, n.d.).

Lorazepam, a benzodiazepine, was chosen as an example. It increased the level gamma-aminobutyric acid type-A (GABA-A) in the brain. GABA is a natural chemical in the brain that helps keep brain activity balanced and calm. It was FDA-approved in 1977 for short-term

treatment of anxiety and for use in anesthetic procedures. In a study with 3,500 participants, the most prevalent adverse effects were drowsiness, dizziness, and weakness. Less frequent side effects included confusion, eye problems, impotence, and severe issues like coma (Ellison & Cancellaro, 1978). Lorazepam is meant for short-term use in anxiety, with effectiveness limited to 6 months (*Ativan, Loreev XR (Lorazepam) Dosing, Indications, Interactions, Adverse Effects, and More*, n.d.). It should not be used by people with acute narrow-angle glaucoma. Warnings include the risk of worsening depression, developing dependence or addiction, and potential harm to the fetus if used during pregnancy. As written in the package inserts, the FDA approved Lorazepam for the treatment of anxiety disorder . It is available in tablet formulations of 0.5mg, 1mg, 2mg, 3mg, and 4mg, as well as injectable formulations, with dosing typically once a day or every 8 hours ranging 1mg to 10mg a day. The medication is not suggested for use in people with kidney or liver dysfunction. It has numerous potential side effects such as drowsiness, weakness, diarrhea, loss of consciousness, and confusion. Additionally, Lorazepam has many drug interactions with other drugs, and carries warnings about an increased risk of coma and death when used with other opioids. Additionally, it has the potential for addiction and abuse. The injectable formulation is primarily used for procedural sedation, reaching its peak effect within 1 to 3 minutes, with sedative effects lasting up to 8 hours. In contrast, the tablet formulation takes approximately 2 hours to reach peak levels, though patients typically begin to feel the effects within 20 to 30 minutes. It takes about 140 hours for the medication to be fully eliminated from the body in adults (*Ativan, Loreev XR (Lorazepam) Dosing, Indications, Interactions, Adverse Effects, and More*, n.d.).

The author of this project agrees that medication can be effective for treating anxiety as short term use. The common classes of drugs prescribed for anxiety are often primarily intended

for depression, which means they are frequently used off-label and are not approved by the Federal Drug Administration (FDA) for this specific purpose. While these medications can offer relief, there are several concerns surrounding their use, including potential side effects, precautions, warnings, and the uncertain effectiveness over the long term. These drugs are dosed in varying strengths, typically taking a few weeks to show full effects. However, they remain in the body for several days to weeks, which means that their side effects can persist long after the drug has been taken. Despite these risks, medications are effective in restoring neurochemical balance in the brain, helping to reduce negative hyperactivity.

3.3 Studied Methods of Mindfulness

This section presents research demonstrating the effectiveness of Mindfulness-Based Interventions. Various tools are used to measure mindfulness, assessing aspects such as trait mindfulness, state mindfulness, avoidance tendencies, and inner peace (CAPP, 2019). However, these tools will not be discussed in detail in this project. One of the most commonly used tool is the Mindful Attention Awareness Scale (MAAS). In 2003, Kirk Warren Brown and Richard M. Ryan developed a tool called the Mindful Attention Awareness Scale (MAAS) to assess how mindful someone is. The MAAS consists of a 15-item questionnaire that specifically excludes questions about mood, attitude, and neutral responses. Individuals who score higher on the scale tend to have higher self-esteem, greater optimism, and a more pleasant attitude, while those who score lower often exhibit signs of anxiety, depression, and emotional instability (CAPP, 2019).

PH.D Psychology Professor, Ascencio Fumero, and his team established "*The Effectiveness of Mindfulness-Based Interventions on Anxiety Disorders. A Systematic Meta-Review"* in 2020. The AMSTAR tool was used to draw conclusions from the meta-review. AMSTAR stands for A Measurement Tool to Assess Systematic Reviews, created in 2007. It is

widely used to assess the quality of systematic reviews, although its details will not be discussed further in this project. This review based on 82 references and 12 reviews draw from MEDLINE and PsycINFO from 2003 to March 2020. The following inclusion criteria were applied to the studies: any type of mindfulness-based intervention (MBI) was considered, with a 95% confidence level of accuracy. Participants were required to have anxiety, and the results had to be measured using a clinical scale or assessment tool. However, some studies did not provide specific pre- and post-intervention values, which could limit the clarity of the results and hinder a complete assessment of the intervention's effectiveness. Out of 82 references only 12 met all the inclusion, but only 10 made through the methodology. A total of 9 out of 12 reviews revealed a positive effect of Mindfulness-Based Interventions (MBI). A potential bias in these studies is that the results appeared more positive when the research was guided by meditation teachers who were also co-authors. Despite these varying results, all studies reported no side effects associated with mindfulness practices. Fumero et al. (2020) noted that no trials have compared different types of mindfulness or their effects on various disorders. Part of the effectiveness also depends on the therapist or trainer. The result shows MBI significantly reduce anxiety level within a moderate size population. It also maintained the effectiveness after the studies were over. Practicing mindfulness helps people notice their thoughts, emotions, and bodily sensations better, enabling them to handle challenges and stress in a more effective way (Fumero et al. ,2020). This connection between mind and body promotes greater balance, reducing the impact of negative patterns and enhancing overall well-being through experience of (Fumero et al., 2020).

In a controlled trial conducted by Dr. Hoge (et al., 2013) and her team, mindfulness was investigated as a treatment for generalized anxiety disorder (GAD) with positive results. The

study called *Randomized Controlled Trial of Mindfulness Meditation for Generalized Anxiety Disorder: Effects on Anxiety and Stress Reactivity* (Hoge et al.,2013). Dr. Hoge holds a Ph.D. in Psychology and works for the Department of Psychiatry in Washington, D.C. The study was located in Massachusetts General Hospital, which involved 93 participants (aged 18 and above) diagnosing with anxiety using the DSM-IV criteria. Over the course of 8 weeks, the participants underwent mindfulness interventions, and their anxiety levels were measured using the Hamilton Anxiety Scale, the Clinical Global Impression Scale, and the Beck Depression Inventory. Additionally, the study took into account stress reactivity during the trial. The exclusion criteria are as follow: a history of mental disorders, alcohol addiction within the past 6 months, suicidal ideation, being on psychosis medication for at least 4 weeks, medical illness, a pre-existing GAD diagnosis, more than 4 classes of meditation-related training, and being pregnant. The participants were randomly separated into two groups: Mindfulness-Based Stress Reduction (MBSR) and Stress Management Education (SME) (Hoge et al., 2013).

The MBSR group met once a week for 2-hour sessions, with additional guided home practice, which included breath-awareness, a body scan, and Hatha yoga. Participants were also required to practice for 20 minutes daily at home. The sessions began with focusing on breathing, followed by body sensations, and then scanning for thoughts and emotions. Any arising sensations, thoughts, or emotions were taught to be accepted in a non-judgmental way. The body scan primarily focused on bodily sensations, while the yoga practice involved stretching and slow movements aimed at promoting healing (Hoge et al., 2013). Participants were also encouraged to bring mindfulness to their daily activities, such as eating and cleaning. Loving-kindness meditation was introduced in the first class, and the sessions were led by an MBSR instructor with at least 8 years of experience (Hoge et al., 2013).

The SME group, as the control group was not provided with any mindfulness training. Instead, they attended 8 weeks of 2-hour daily classes and 4-hour weekly sessions. These classes covered topics such as stress management, stress physiology, insomnia, and the relationship between stress and other factors, such as food. The SME group also received guidance from instructors with at least 9 years of experience. After the 8-week intervention, all participants underwent a stress test involving 8 minutes of public speaking, followed by 5 minutes of distraction, with evaluators and a camera. The setting varied, with different evaluators, speech tasks, and negative feedback about previous performances. After the trial, only 2% of the MBSR group reported side effects, such as muscle soreness, while 2% of the SME group experienced sleep disturbances. This trial shows that mindfulness-based programs, especially Mindfulness-Based Stress Reduction (MBSR), can help alleviate anxiety and manage stress effectively. However, additional studies are required to gain a comprehensive understanding of the long-term impacts and to tailor interventions to individual needs (Hoge et al., 2013).

In another randomized clinical trial, *Mindfulness-Based Stress Reduction vs Escitalopram for the Treatment of Adults With Anxiety Disorders: A Randomized Clinical Trial*, conducted by Dr. Hoge et al. in 2023, they compared two groups: one taking Escitalopram and the other participating in Mindfulness-Based Stress Reduction (MBSR). The study included 208 participants, with 102 in the MBSR group and 106 in the Escitalopram group. The trial was conducted at three hospitals in the USA, located in the cities of Boston, Massachusetts; New York; and Washington, DC. The CGI-S scale was used to assess the severity of symptoms and to separate and randomize participants into groups. It was also used to assess improvements or worsening of participants' conditions at weeks 1, 2, 4, 6, and 8 of the trial. Additionally, the

Overall Anxiety Severity and Impairment Scale was used to measure the outcome of the treatment. The participants underwent an 8-week study (Hoge et al., 2023).

The MBSR group attended weekly 2.5-hour sessions and practiced mindfulness for 45 minutes daily at home, with a one-day retreat scheduled during the 5th or 6th week. The method of MBSR that Hoge et al. applied in this 2023 trial was the same as the one used in the 2013 trial previously mentioned. MBSR in this study involved techniques such as focusing on breathing and physical sensations, performing body scans, and cultivating awareness of daily movements. The Escitalopram group received a daily dose of 10mg, which was increased to 20mg after 2 weeks if tolerated. The main inclusion criteria were adults aged 18-75 with anxiety disorders, excluding those with psychotic disorders, combative disorders, PTSD, or those taking antipsychotic medications. The results showed that both treatments were equally effective. However, further research is needed to make a stronger claim that MBSR can be as effective as other drug classes in treating anxiety. Nevertheless, MBSR significantly improved the emotional state of all participants with anxiety (Hoge et al., 2023).

In 2024, Andrea Calderone, an Italian psychologist, and her team conducted a systematic review on the changes in the brain resulting from mindfulness therapy called *Neurobiological Changes Induced by Mindfulness and Meditation: A Systematic Review*. They initially selected 151 sources, but only 9 studies met the inclusion criteria. These criteria were: the study must connect mindfulness with neuroplastic change, be in English, clearly assess patients' functional outcomes, and have a clear protocol. Calderone et al. (2024) noted that mindfulness meditation has its roots in ancient Buddhism. It focuses on contemplation being recognized for its usefulness in both psychological and medical practices today (Calderone et al., 2024). Calderone et al.'s (2024) review also referenced Santarnecchi (2014), who conducted a study with 23

participants over 8 weeks of Mindfulness-Based Stress Reduction (MBSR). The program involved 2.5 hours of daily sessions, with 45 minutes of practice at home. Two counselors guided participants to focus on breathing, body sensations, internal and external sounds, taste, thoughts, and emotions. This research demonstrated that mindfulness can increase brain thickness in areas responsible for sensory processing and emotional regulation, potentially reducing anxiety, depression, and worry (Santarnecchi,2014). Calderone et al. (2024) also mentioned the article *Mindful Attraction and Synchronization: Mindfulness and Regulation of Interpersonal Synchronicity* by A.S. Haas (et al., 2014) which highlighted that increased awareness allows meditators to tune into a frequency that enhances mutual interactions with others. He briefly explained Dr. Jon Kabat-Zinn mindfulness therapy, who applied mindfulness as a treatment for his patients with stress disorders. Dr. Kabat-Zinn conducted an 8-week trial with weekly 2.5-hour sessions to guide participants in meditation, which included body scans, breathing exercises, and observing sensations without judgment. The therapy recommended 45 minutes of daily meditation practice (Calderone et al., 2024).

A psychiatrist, Chris Mace, briefly discussed mindfulness in a psychiatric journal through his article *Mindfulness in Psychotherapy: An Introduction* (2007*).* He shared various definitions of mindfulness from prominent figures. Mace (2007) stated that "Dr. Goleman (1988) defined it as experiencing reactions as if seeing them for the first time; Thich Nhat Hanh (1991) described it as keeping the mind in the present moment; Dr. Kabat-Zinn (1994) described it as focusing on the present moment without judging it.; and Germer (2005) defined it as accepting the present moment with focus" (Mace, 2007, p. 147). Mace (2007) explained that mindfulness can be applied in different ways, with various styles of personal practice. One approach is to begin by practicing mindfulness during daily activities such as driving, reading, and eating, before

progressing to seated meditation where one focuses on the breath, body sensations, or sounds. Mace (2007, p.149) suggested a 10-step method for practicing mindfulness:

1. Sit comfortably in a still setting.
2. Keep the spine straight and close your eyes.
3. Bring awareness to any contact your body is making with the surface you're sitting on.
4. Focus on your breath, noticing its movement as it enters and leaves your chest and abdomen.
5. Pay attention to the rise and fall of your abdomen with each breath.
6. Observe the sensations that accompany each breath.
7. Notice when your mind wanders, and gently bring it back to the breath.
8. Be diligent and patient.
9. After about 15 minutes, bring your awareness back to the whole body and the area where you're sitting.
10. Open your eyes and end the session (Mace, 2007, p. 149)

Mindfulness has changed a lot over the years and has made a major impact on psychotherapy. It has led to the development of techniques like Mindfulness-Based Stress Reduction (MBSR), Mindfulness-Based Cognitive Therapy (MBCT), and Mindfulness-Based Eating Awareness. Psychotherapists have made some adjustments to these applications to help practitioners achieve mindfulness. This suggests that modern mindfulness therapies have largely been developed by clinicians as a way to branch out from traditional Buddhist teachings. While the theory and application of mindfulness are still evolving, therapists cannot deny its effectiveness as a key part of psychotherapy (Mace, 2007).

In 2022, Maria Komariah, an Indonesian nurse, and her team conducted a study to examine if mindfulness of breathing could reduce stress, anxiety, and depression in the midst of university students. The article is called *Effect of Mindfulness Breathing Meditation on Depression, Anxiety, and Stress: A Randomized Controlled Trial among University Students.* The study involved 122 students from 16 universities across various regions of Indonesia. Participants were to be Indonesian university students aged 18 or older, without severe mental disorders, who were experiencing stress or anxiety. The students were randomly separated into two groups: a mindfulness therapy group and a control group, with 61 students in each. Age and religion were also factors considered in the results. The 4-week trial was conducted remotely via WhatsApp and Zoom. In the mindfulness therapy group, participants practiced mindfulness breathing for 15 minutes daily for two weeks, with guided sessions. For the following two weeks, participants practiced on their own with daily reminders. The control group was provided with materials on mindfulness of breathing but did not practice together or receive reminders. The method involved sitting comfortably, focusing on the breath in the abdominal area, and observing the sensations and emotions in the present moment without reacting or becoming distracted by anything else. At the end of the 4 weeks, the mindfulness therapy group revealed notable reductions in anxiety, stress, and depression, while the control group showed no changes. The findings showed a notable enhancement in well-being among the mindfulness group relative to the control group. Mindfulness can be practiced anytime, anywhere, making it an excellent tool for managing or preventing anxiety, even in the stressful lives of university students (Komariah et al., 2022).

In addition, Diana Winston (2016), the director of mindfulness education at UCLA, stated that breathing meditation is a fundamental method for cultivating mindfulness. She recommends

starting with 15 minutes of practice daily for at least a week. If your attention drifts during practice, gently bring it back to your breath. The more time an individual dedicates to the practice, the greater their ability to focus. The first step is to take a deep breath in and out, then begin to observe the natural rhythm of the breath as it flows in and out. It is important to find a comfortable sitting position and relax any tension in the body. One can focus on the breath either at the tip of the nostrils or the abdomen. Allowing the individual to choose a point where the breath passes that feels comfortable to focus on, without any restrictions (Winston, 2016).

Based on these methods, the author of this project agrees that mindfulness has an impact on changing the chemical structure of the brain (Santarnecchi,2014) (Mace , 2007), indirectly affecting neurochemistry and enhancing physiological and emotional regulation (Calderon et al., 2024). These methods are typically conducted over just a few months. However, it must be practiced consistently to see results, and the longer the duration, the deeper the level of focus. Some studies incorporate different styles of mindfulness throughout the process, which can lessen the focus on a single type. This could weaken the impact of the results, making it hard to determine which specific type of mindfulness is most effective. Surprisingly, the end results still show benefits for those who apply mindfulness.. However, the exact step-by-step mindfulness therapy used in these studies was not disclosed, making it difficult to compare similarities between them. One common factor noted is that mindfulness in these studies includes breathing as a core component. The concept of breathing is to focus intense attention on the breath, which helps calm the body and, in turn, the mind. When the mind and body are in equilibrium, anxiety is reduced.

3.4 Scriptures and Yogic Methods of Breathing Mindfulness

Stemming from the source texts and commentarial literature in literature section above, mindfulness can take the form of various contemporary techniques such as counting, following, and observing. Ultimately, these practices aim to calm the body and alleviate anxiety symptoms, but they can also transform the mind and behavior, fostering a more positive outlook in the long term. This section will focus on the breathing techniques associated with mindfulness of the mind, rooted in the Sutta on teachings of mindfulness and the Buddhist commentaries.

Within this project, mindfulness breathing is derived from 16 exercises linked to the four foundations of mindfulness, known as Vipassana (Buddhadasa,1976). These 16 techniques are categorized into four main areas: mindfulness of the body, mindfulness of sensations, mindfulness of the mind, and mindfulness of the objects of the mind. Each category aims to cultivate awareness in different aspects of our experience, promoting a deeper understanding of the present moment (Goenka & Hart, 2000). According to S.N. Goenka (2000), learners should practice mindfulness for 10 to 15 minutes every morning and evening to fully experience its benefits. Each course generally lasts between 30 to 40 minutes, combining both teaching and practice. Students are encouraged to be patient with themselves and to maintain a regular practice. To accommodate different needs, the institute offers a variety of courses, including one-day, three-day, and ten-day programs, allowing learners to gradually deepen their practice and understanding (Goenka & Hart, 2000).

The Goenka foundation offers a 10-day retreat that follows a three-step progression. To begin, participants are encouraged to abstain from taking life, stealing, engaging in sexual misconduct, speaking falsely, and partaking in intoxicants throughout the course. Next, learners are introduced to mindfulness by focusing on the breath, specifically monitoring its movement at

the tip of the nose. In the following days, participants are guided to observe and understand their sensations, learning how to remain calm and refrain from reacting to the arising sensations. On the final day, the practice shifts to loving-kindness meditation, where participants are encouraged to share experiences of calmness and kindness with one another, fostering a sense of compassion and connection (*10 Day Courses | Vipassana Research Institute*, n.d.).

In *Abhidharmakosabhasyam* Volume III, translated by Sanchali Bedi (2020), Vasubandhu explains that mindfulness can help overcome unpleasant experiences and desires. Such meditation leads to stillness, which in turn provides insights that guide one toward nirvana. Mindfulness of breathing involves being aware of the breath entering and exiting. It includes six steps that should be followed in order: counting, following, fixing, observing, modifying, and purifying (Bedi, 2020, p. 923).

1. Counting helps keep the mind focused on the breath without forcing it. Vasubandhu suggests counting from one to ten, making sure the count is accurate and continuous. If distracted, start over from one, ensuring no count is missed.
2. Following the breath means observing its path as it enters and leaves the body. One should notice how far the breath travels and where it reaches, such as the organs or down to the feet. When the breath exits, note how long it lingers, like a stretched arm or hand.
3. Fixing the focus involves concentrating on a specific point, such as the tip of the nose, the eyebrows, or any point from head to toe. The mind should visualize the breath as a thread moving through the body at this focus point, observing whether the breath feels hot or cold, pleasant or unpleasant.

4. Observing the breath involves recognizing it as one of the four elements. It's also important to realize that the breath is part of the physical aggregates, while the mind belongs to the mental aggregates (including sensations, perceptions, and consciousness).
5. Modifying represents an advanced level of mindfulness, where one's awareness expands to all phenomena, transforming the mind.
6. Purifying is the final stage, where one enters the path of seeing and gains "knowledge of extinction, non-arising, and the correct views of the Arhat" (Bedi, 2020, p. 923).

These six stages of mindfulness help purify the mind, leading to deeper insights and, ultimately, liberation (Bedi, 2020.).

As mentioned in the literature review, the breathing technique from the *Satipatthana Sutta* section teaches focusing on the breath. Ven. Soma Thera's (1998) commentary on the *Satipatthana Sutta* explains the different types of breathing techniques that an individual can apply. Before beginning meditation, an individual should set a time frame and sit comfortably, preferably cross-legged, as this position can enhance focus and attention. During the practice, the practitioner observes, "I am breathing in" and "I am breathing out," noting the breath's length, such as, "I breathe in long" and "I breathe out long" (Soma Thera, 1998). As the practice continues, the individual becomes aware of the sensations associated with inhaling and exhaling. Over time, the practitioner trains to recognize the whole body breathing in as the breath enters and the whole body breathing out as the breath leaves. This focus should be maintained from the beginning to the end of the meditation session without losing track.

The next step involves using the breath to calm the body's activity. As the individual breathes in and out, they should think that each breath brings tranquility and peace to the body. With consistent practice, the individual will notice the breath changing from coarse to fine,

eventually becoming so subtle that it is nearly unnoticeable (Soma Thera, 1998). As the breath becomes finer, the body also becomes calmer. The connection between mind and body is clear—when the body is calm and relaxed, the mind mirrors that calmness. Finer breaths lead to a calmer mind. At this point, the practitioner should recognize that the breath is a sense impression, which connects to feelings, perceptions, mental volition, and consciousness. By examining the impermanence of these five aggregates, the individual will come to understand and experience the impermanence, no-self, and suffering within the mind and body (Soma Thera, 1998).

The sutta explores additional concepts and Ven. Soma (1998) engaged in more advanced levels of meditation, but these topics are beyond the scope of this discussion and will not be covered here. The purpose of this initiative is to soothe existing anxiety and help the body find a state of calm. Achieving higher meditative absorption requires more intense and prolonged practice, which goes beyond the scope of this project (Soma Thera, 1998). The author's goal is to ease the anxiety and bring calmness to the body through breathing techniques, rather than exploring methods for attaining liberation.

In *The Miracle of Mindfulness* book, Ven. Thich Nhat Hanh (1987), a prominent Buddhist monk, recommended starting mindfulness practice by sitting in a relaxed posture for about 20 to 30 minutes. During this time, the focus should remain on the breath, observing each inhale and exhale while letting go of any distractions that come to mind. The goal is to merge with the breath, allowing the mind to follow it in and out, just as a pebble sinks into a pond without attaching to anything. Ven. Thich Nhat Hanh (1987) believed that this practice creates an opportunity to experience a sense of calm and peace. It’s important not to focus on the passage of time but to be fully present with the breath in each moment. If someone cannot find

peace and joy in meditation, he suggested they may not be practicing properly. With consistent daily practice, over the course of several months, one will likely experience a greater sense of peace. Additionally, Venerable encouraged practicing mindfulness with others, as it promotes a stronger connection between the mind and body, as well as fostering deeper relationships between individuals (N.Thich, 1987).

The author of this project believes that the primary similarity among these methods is their ability to bring the mind back into focus. Since breath is an integral part of the body, regulating it indirectly calms the mind. When the body and mind are in equilibrium through sustained practice, the practitioner can enter different states of meditative absorption, which bring joy and liberation. Venerable Soma (1998) and S.N. Goenka's (Goenka & Hart, 2000) guidance was based on Vipassana, which incorporates four fundamental mindfulness meditations. However, the author chose to focus on the first foundation of Vipassana, emphasizing the cultivation of body calmness. A detailed exploration of the other three foundations would require much more explanation and analysis. Vasubandhu, a prominent monk, discovered a six-step process in breathing meditation. While breathing meditation techniques are diverse, the examples provided above are drawn from documented yogic teachings passed down through generations. It's important to seek proper guidance, as calmness needs to be carefully developed. Practicing with a group also offers stronger support than practicing alone. Breathing meditation, when practiced with guidance, can yield numerous benefits.

CHAPTER 4: FINDINGS

4.1 Mindfulness as Therapy for Anxiety Studies

Emerging research shows that mindfulness, especially with breathing techniques, can help treat anxiety. This section explores various findings on the use of mindfulness in treating anxiety, along with its associated benefits. A search on Google Scholar for "mindfulness breathing with anxiety" finds 199,000 studies, with 17,000 of them published between 2021 and 2025. This shows that mindfulness is gaining attention in the health field worldwide. This section will revisit key studies from Chapter Three of this project, along with other relevant researches, to demonstrate their significance.

In the book *Focus*, Daniel Goleman (2015), an American psychologist and journalist, discusses the effects of mindfulness on brain regions, noting a psychologist's emphasis on the changes in the brain linked to this practice (Goleman, 2015). Goleman (2015) mentioned the *Inner Resilience* program, designed by Linda Lantieri, which aimed to help children and teachers regain composure after the September 11, 2001 attacks on the World Trade Center. This program incorporated breathing techniques, which were taught to children and led to improvements in attention, sensitivity toward others, reduced aggressive behavior, and a greater sense of calm. A key strategy from the program was to use traffic light metaphors when facing a problem. The "red light" symbolized a signal to stop and take a deep breath until feeling more composed. The "yellow light" represented a time to think about potential solutions, and the "green light" was for implementing the plan. Interestingly, this approach helped enhance emotional and cognitive brain regions, making it easier to handle stressful situations. Those who practiced mindfulness were more emotionally and cognitively flexible, which led to better interactions with others (Goleman, 2015).

Goleman (2015) also notes that mindfulness is used by several large companies, including Google, Target, Cargill, and Honeywell Aerospace, to improve the well-being of both leaders and employees. He mentioned Philippe Goldin, a psychologist, conducted a study on Google employees and found that participants reported feeling less stressed and more empathetic. Breathing techniques also helped one division at General Mills alleviate feelings of being overwhelmed. Furthermore, Goleman (2015) highlights several benefits of mindfulness: increased productivity, the ability to release unpleasant experiences, reduced self-talk, the transformation of negative emotions into positivity, and enhanced memory and focus (Goleman, 2015) .

Next, the findings of mindfulness-based intervention (MBI) therapy are from a 2020 meta-review by Ascension, PH.D psychology professor. Fumero and his team looked at 82 studies and 12 reviews on mindfulness-based interventions (MBIs) (Fumero et al., 2020). The method was outlined in methodology section above. A meta-review refers to the process of selecting a specific topic, reviewing and synthesizing the findings of multiple literary trials or studies on that topic, and then evaluating the collective results. In a meta-review, the reviewer assesses the strengths and weaknesses of the existing literature, compares different research outcomes, and provides recommendations based on the overall analysis (Russo, 2007). It was noted that mindfulness applications have not always been equally effective, particularly in pain treatment, where they may not produce significant changes (Fumero et al., 2020). Additionally, there is bias in studies that compare meditation with and without a teacher. It was noted that practicing mindfulness with the guidance of an experienced teacher typically results in more positive outcomes (Fumero et al., 2020). The Mindfulness-Based Intervention (MBI) discussed in this meta-review encompasses various components, including mindfulness in cognitive

therapy, breathing, acceptance, and self-compassion, among others. No major side effects were observed, although a few participants experienced stress or dizziness.

However, the application of mindfulness concepts and methodologies differs across studies. These variations include differences in populations, settings, duration, techniques, and clinical measurement tools, which leads to diverse conclusions. In general, the research provides clear tables and methods. It was also noted that the experience of the therapist and cost are critical factors when evaluating the effectiveness of mindfulness interventions (Fumero et al., 2020). Currently, no clinical trials directly compare different mindfulness strategies, which prevents drawing conclusive evidence. Of the 82 studies reviewed, only 40% were considered to be of good quality. Nine out of twelve reviews showed a positive effect of MBI. It was found that MBIs are equally effective when compared to cognitive therapy for anxiety disorders. In general, most literature suggests that these interventions are effective in reducing anxiety, providing moderate relief for individuals facing such challenges, and fostering high adherence to MBI. The author of this meta-review declared no conflict of interest (Fumero et al., 2020).

Overall, Fumero's (et al., 2020) review was supported by Prof. Tang's (et al., 2015) article, which discusses the neuroscience behind mindfulness and its benefits in treating psychological issues such as depression, social functioning, and other health problems. Tang et al. (2015) highlights that mindfulness affects brain regions involved in self-regulation and enhances attention, which in turn cultivates a healthy mind and well-being. He emphasizes mindfulness as a the potential alternative treatment and advocates for larger trials to compare its benefits across various aspects, including aspects social, behavioral, cognitive, and emotional (Tang et al., 2015).

In 2023, Dr. Elizabeth Hoge and her team conducted an 8-week randomized clinical trial with 208 adults suffering from anxiety. They compared mindfulness-based treatment (MBT) to the medication Escitalopram and found that MBT was just as effective, offering a potential alternative treatment for anxiety. The method used in this trial, mentioned in the methodology section, focused on breathing, body scans, body sensations in a sitting position, and mindful movements. One of the key findings was that participants in the MBT group reported fewer side effects compared to those taking the medication. Of the 208 participants, half were randomized into the MBSR (Mindfulness-Based Stress Reduction) group and others into the Escitalopram group. The results showed improvement in both groups, with MBSR proving equally effective as escitalopram. However, 5% of those in the escitalopram group experienced side effects such as sleep disturbances, nausea, fatigue, headaches, somnolence, delayed orgasm, abnormal dreams, decreased appetite, jitteriness, lightheadedness, increased sweating, and anxiety. The only adverse effect reported in the MBSR group was anxiety. MBSR was found to be as effective as escitalopram and better tolerated because it had fewer side effects. One weakness of Dr Hoge's (et al., 2023) study was that the sample mainly included highly educated women from three urban medical centers, which may not accurately reflect the broader population (Hoge et al., 2023).

The study highlighted that focusing on the present moment helped calm the hyperactive thoughts typical of anxiety, making individuals less reactive to their thoughts and sensations. Over time, mindfulness seemed to foster growth in self-acceptance and self-compassion. Dr. Hoge et al. (2023) referenced a 2015 study by Roemer Lizabeth (et al., 2015), which found that Buddhist mindfulness enhances positive emotions, reduces negative emotions, and decreases behavioral avoidance, offering long-term life benefits (Roemer et al., 2015). This trial suggests

that MBSR could be a viable alternative to medication or used as an adjunct to medication, providing high benefits with low risks. Dr. Hoge (et al. 2023)also expressed interest in studying MBSR in settings with virtual guidance rather than through applications, which could further expand its accessibility and impact (Hoge et al., 2023).

In 2013, Medical Doctor, Elizabeth Hoge and her team conducted a different study to see how well mindfulness therapy works for people with generalized anxiety disorder (Hoge et al., 2013). During the 8 weeks course, 89 participants were divided into two groups: 48 received mindfulness therapy, while 41 participated in stress management education. Stress tasks were administered between sessions, and stress levels were measured by Clinical Global Impression-Severity (CGI-S) tool. The mindfulness therapy incorporated practices such as mindful breathing, body scan awareness, and yoga, all aimed on nurturing mindfulness of the present moment, free from reactions to current experiences. The outcomes indicated that the mindfulness group had lessen the anxiety levels and better coping skills compared to those in the stress education group (Hoge et al., 2013).

Dr. Hoge (et al., 2013) suggested that mindfulness increases self-awareness, which, in turn, could help reduce anxiety by promoting a more positive mindset. However, there were several limitations to the study, such as a small participant pool, combining individuals with depression and anxiety, and sleep disturbances reported by some participants. These issues may have been related to the inclusion of SSRIs and benzodiazepines during the trial (Hoge et al., 2013). Dr. Hoge (et al., 2013) also referenced Scott Bishop et al. (2004) findings, which suggested that mindful breathing enhances awareness of both the mind and body . By simply observing and focusing on the breath, individuals can gain insight into the fluctuations of their thoughts and bodily sensations (Bishop et al., 2004). Dr. Paul Nestadt noted that these anti-

anxiety medications can lose their effectiveness over time as the body builds a tolerance, which often leads to the return of symptoms (*Why Aren't My Antidepressants Working?*, 2024).

Overall, the study underscores the promising effects therapy reducing anxiety and improving coping strategies in individuals with generalized anxiety disorder. Future studies with larger, more diverse participant groups and tighter control of medication use could provide a better understanding of how mindfulness interventions benefit those with anxiety disorders (Hoge et al., 2013).

In 2024, Andrea Calderone et al.'s review found that mindfulness practice led to positive changes in brain areas associated with mood, emotional control, and a reduction in symptoms of anxiety disorders (Calderone et al., 2024). Additionally, research mentioned by Calderone et al. showed that mindfulness techniques, such as breath-focused meditation, are linked to greater thickness in brain areas involved in emotional regulation. These structural changes in the brain contribute to reduced level of anxiety and improvement in quality of life. Additionally, this review had shown that mindfulness meditation can increase in gamma-aminobutyric acid (GABA) levels—a neurotransmitter known for its calming effects in the brain. Higher GABA levels help lower the hyperactivity in the brain, which is often linked to anxiety, thus promoting a more balanced and relaxed mental state. Calderone et al. (2024) explained that the purpose of meditation is to achieve mental clarity and deep inner peace. Through this practice, individuals can cultivate resilience by not becoming attached to their emotions and thoughts, thus gaining control over them. There are various meditation techniques, including moment awareness, transcendental meditation, loving-kindness, and breathing exercises. Each type of meditation caters to different individual needs. While mindfulness has gained more attention, it is often described as using breath or any focal point as a means to raise awareness, aiming to help

regulate emotion and thoughts. Calderone et al. believed that mindfulness can change the brain's cortex and improve brain activity transmission (Calderone et al., 2024).

Calderone et al. (2024) referenced a study by Serpa et al. in 2014, which showed that mindfulness improved anxiety, depression, and suicidal thoughts in 79 veterans. Their study demonstrated that mindfulness significantly contributes to mental health (Serpa et al., 2014). Additionally, Calderone et al. (2024) noted that a 2010 study by Hölzel and his team found that an 8-week mindfulness practice program increased the production of brain-derived neurotrophic factor, which is linked to prolonged life, improved memory, and enhanced mental processing (Calderone et al., 2024). The findings in this paragraph parallel Esch Tobias's (2014) statement that mindfulness practices lead to increased levels of dopamine and melatonin, while also helping to balance serotonin. Additionally, mindfulness is associated with reduced levels of norepinephrine and cortisol. Together, these neurochemical changes contribute to enhanced awareness, improved emotional regulation, and reduced anxiety (Esch, 2014).

Calderone et al.'s (2024) information was gathered from extensive databases such as PubMed, Web of Science, Cochrane Library, and Embase. However, the study has limitations due to variations in inclusion criteria, populations, and methodologies (Calderone et al., 2024). There are still many areas regarding the benefits of mindfulness that warrant further study for future mental health treatments.

In an article *Mindfulness in psychotherapy: an introduction*, Chris Mace (2007) discussed the impact of mindfulness on mental health, noting that it warrants further studies. He covered various mindfulness techniques, including breathing exercises, body scanning mindfully and coupled with mindfulness of thoughts and physical sensations, and explained several different types of mindfulness practice. Mace (2007) pointed out that therapists with mindfulness

experience often achieve better results for their patients than those without such training. He noted that researchers have most studied mindfulness in relation to anxiety, depression, hallucinations, memory, addiction, violence, attitude, empathy, and self-awareness. Mace (2007) also recognized that mindfulness therapy is expanding in its diverse techniques and has secured a significant place in psychotherapy (Mace, 2007).

The clinical trial conducted by Komariah and her team showed that mindful breathing can be effective in treating anxiety and stress (Komariah et al., 2022). The study involved 122 students from 16 universities across different regions of Indonesia, who practiced for 15 minutes daily over the course of 4 weeks. According to Komariah et al. (2022), college students around the world are experiencing significant stress and depression. The study measured students' anxiety and stress levels before and after the 4-week period, with contactless check-ins and reminders to encourage participation. Komariah et al. (2022) stated that her findings align with those of one of her reference sources, specifically the study by Ibrahim et al. (2022). Ibrahim et al. (2022) found that Mindfulness-Based Stress Reduction (MBSR) enhanced better health and happiness and reduced stress among nurses working with COVID-19 patients (Ibrahim et al., 2022). Komariah et al.'s (2022) data indicated that students worldwide are affected by stress, with 50% in China, 60% in Brazil, and 25% in Indonesia reporting moderate to extreme stress. Komariah et al. (2022) believed the trial didn't show a larger effect because the duration was short, and the daily practice time (15 minutes) was less than other trials that involved 2.5 hours of practice over at least 8 weeks. In conclusion, mindful breathing can be a viable alternative to medication for treating anxiety. This highlights the global impact of mindfulness breathing in reducing anxiety for college students. The study also demonstrates that internet-based mindfulness programs can be effective, even when in-person guidance is not accessible.

The author of this project points out that many studies have shown mindfulness can help improve mental health and well-being. Practicing mindfulness has been found to calm the brain by helping balance chemicals that can become unbalanced during times of stress or anxiety. It also promotes a sense of calm by leading to changes in brain formation, especially in areas related to emotional regulation. Mindfulness is now being used in many parts of society. Dr. Daniel Goleman (2015) reported that large companies are using mindfulness to help reduce stress among employees. He studied how breathing-focused mindfulness changes brain areas linked to better emotional balance, memory, and attention. Fumero et al. (2020) found that different forms of mindfulness, especially breathing techniques, helped reduce anxiety. Elizabeth Hoge et al.(2023) found that mindfulness worked just as well as Escitalopram, a first line anti-anxiety medication. Calderon et al. (2024) found that mindfulness can increase GABA, a brain chemical that helps calm the mind. He also noted that mindfulness might change brain structure in ways that help control emotions. His research lines up with findings from Holzel (et al., 2011), who saw increased brain growth, and Esch (2014), who reported boosts in dopamine, serotonin, and melatonin. Dr. Tobias Esch (2014), who wrote a book on mindfulness and its effect on the brain, discovered that mindfulness increases dopamine (a feel-good chemical) and lowers levels of cortisol and norepinephrine (which are linked to stress), while serotonin stays the same. Other researchers like Chris Mace (2007) and Komariah et al. (2022) also found that mindfulness has a positive effect on anxiety, depression, memory, self-awareness, and stress.

Mindfulness helps people focus by reducing distractions and making them more aware of what they are doing, which can also improve productivity. While the studies reviewed used different methods, sample sizes, and locations—which makes it harder to apply the results to everyone—they still show important patterns. Most of these studies compare mindfulness with

no treatment or basic control groups, rather than with medication. Even so, one strong and consistent finding is that breathing exercises used in mindfulness are helpful for mental health, whether practiced in-person or remotely. These results show the need for more research comparing mindfulness with medication directly.

4.2. The Benefits of Mindfulness: A Buddhist Perspective

This section explores the benefits of mindfulness from a Buddhist perspective. In the book *Guidance and Insights from The Buddha*, Harvey (2017) explained that Buddhist mindfulness helps individuals avoid reacting to negative thoughts and emotions. It fosters greater awareness, enabling one to observe negativity as it arises without being influenced by it. He also emphasized the four foundations of mindfulness, which can help alleviate grief, pain, and unhappiness. These foundations include mindfulness of the body (covering aspects such as breathing, posture, movements, body parts, elements, the corpse, and stages of decay), mindfulness of feelings, mindfulness of the mind, and mindfulness of reality-patterns. In particular, practicing mindful breathing has the ability to help understand and reduce intense desires and unhappiness (Harvey et al., 2017).

In the book *Vimalakīrti – The Radiant Heart Amidst the Mango Grove*, Venerable Thich Huyen Chau, a Buddhist monk and CEO of Sakya Buddha University, explained that the purpose of breathing is to lead to liberation, while also highlighting how the breath is fragile and its existence depends on whether it continues or ceases. "The body is empty of 'I' or 'mine'" (H.Thich, 2023, p. 113), because "to have a body is to have suffering" (H.Thich, 2023, p. 109). This understanding and acknowledgment are not meant to bring pessimism but to serve as a means of cultivating joy and happiness in everyday life. No one deserves to live a life consumed by fear, anxiety, and worry, especially since life itself can change in the span of a single breath

(H. Thich, 2023). Technique mindfulness of breathing serves a way to detach from the unpleasant experiences or conditions and foster equanimity and meaningful in life.

SN Goenka (2000) believed that Dhamma is pure, and that defilements arise within the mind, creating suffering and misery. Mindful breathing serves as a way to purify the mind. When the mind is pure, life feels happier and more fulfilling. This practice has been passed down for over 2,000 years because its benefits have been proven by those who have practiced it. Goenka points out that while a person can control the body's external movements, they cannot control the inner workings of the mind, let alone understand its progression. Practicing mindfulness helps practitioners reach a deeper understanding of both mind and body by recognizing the progression and creation of defilements. Over time, mindful breathing connects to a deeper level of the mind. The breath should be observed in its natural flow, without force. At a subtle level, one can observe the movement of air within the body and become aware of the rise and fall of thoughts and emotions. Learning the technique alone is not enough to experience its full benefits; only through consistent practice can one attain happiness. With more experience, a person can gain insight into themselves and the mind, leading to liberation. When an individual is at peace and happy, their positive energy radiates to those around them (*The Importance of Natural Respiration by S N Goenka | Vipassana Research Institute*, n.d.).

There are numerous insightful commentaries on mindfulness of breathing in Buddhism. In the book *Anapanasati* by Buddhadasa (1976) translated by Ven. Nagasena, explains that the practice of mindfulness leads to mental calmness and happiness. He highlights that the mindfulness of breathing, as outlined in the 16 steps of *Anapanasati*, offers three key mental benefits: it cultivates happiness in the present moment, enhances awareness and clear comprehension, and builds resilience by staying nonjudgmental toward external influences

(Buddhadasa, 1976). Mindful breathing is simple and accessible, making it an effective focus for meditation.

Venerable Thich Nhat Hanh (2021) emphasized that mindfulness means being fully aware of the present moment. He explained that proper breathing can strengthen blood flow and revitalize the organs by ensuring they receive an adequate supply of oxygen. Beginners can start with 20 to 30 minutes of mindfulness practice each day and gradually extend the duration as they become more immersed in the peaceful, quiet state of mind. Before long, they may not even realize how quickly time passes. As Ven. Nhat Hanh states, "breath itself is mindfulness" (N. Thich, 2021, p. 23). Mindfulness is not limited to sitting and observing the breath but can be practiced throughout daily activities (N.Thich, 2021).

The author of this project suggests that, based on various Buddhist commentaries on mindfulness, mindful breathing plays a key role in achieving equanimity. According to Buddhist Venerable Thich Nhat Hanh (2021), and Venerable Thich Huyen Chau (2023) and experienced practitioners, S.N. Goenka (2025) and Harvey (2017) in above paragraphs, practices such as mindfulness of the body in Vipassana and teachings from the Mindfulness of Breathing Sutta lay the foundation for calming the body and, at more advanced stages, moving toward liberation. In these practices, breathing combines both concentration and contemplation. Focusing on the breath acts as a single-pointed attention, helping to reduce distractions and strengthen concentration. Actions such as observing and counting the breath involve active awareness and belong to the domain of contemplation, as they require conscious engagement. Breathing is also said to purify the mind, serving as a bridge between body and mind (S.N. Goenka, 2000). Since breathing directly affects physical functions, mindful breathing helps regulate respiratory patterns, allowing more oxygen to reach the lungs and circulate throughout the body (N.Thich,

2021). As oxygen is carried by red blood cells, steady and calm breathing naturally improves oxygen exchange. This physical regulation contributes to balancing neurotransmitters in the brain, which helps calm the body—and, in turn, brings peace to the mind. Mindful breathing, as taught in Buddhism, helps create a calm and steady rhythm of breath. Fast, shallow breathing often indicates stress, while slow, rhythmic breathing promotes calmness. Mindful breathing trains the mind to stay anchored on one point, reducing mental distractions and helping prevent fatigue caused by overthinking. Mindfulness not only helps regulate our physical functions but also nurtures wisdom. This wisdom is key to attaining true liberation. A liberated mind can recognize and eliminate the root of all suffering. Therefore, even the distress caused by anxiety can be eased and potentially overcome through mindfulness.

If mindfulness of breathing weren't effective in helping to overcome inner afflictions, it wouldn't have endured in monastic practice until today. For instance, Venerable Thich Huyen Chau has practiced mindful breathing for over 30 years and has shared its profound potential to calm the mind, end suffering, and cultivate true equanimity. Although different sources may describe various methods or perspectives on mindfulness, the underlying aim remains consistent: to develop focus, become aware of impermanence, let go of unhealthy attachments, and awaken a deeper sense of peace and happiness in life.

CHAPTER 5 : CONCLUSION

5.1 Objective

Anxiety disorder is one of major mental health conditions that affects people globally, regardless of ethnicity, background, or social status. Working in a pharmacy setting, the author of this project have encountered many patients prescribed medications to manage anxiety. These individuals often rely on medication to help them feel calm and function in daily life. However,

some have shared that while the medication provides temporary relief, the symptoms frequently return, leading to a cycle of relapse. Long-term anxiety can trigger enduring physical reactions, including rapid heart rate and shortness of breath. When the body is repeatedly placed in a state of stress—often described as "combat mode"—it can eventually lead to heart related complications (Hanson & Mendius, 2009). Anxiety disrupts not only mental peace but also causes physiological changes that can be harmful over time. Interestingly, one of the simplest yet most effective tools for managing anxiety is something we all possess: the breath. Breathing itself is neither positive nor negative, but it can be consciously used as a tool for focus and emotional regulation. Breath-based meditation has been shown to reduce anxiety by helping individuals anchor their awareness in the here and now.

With practice, individuals start to develop more insights of the natural rhythm of their breath—how it flows in and out —highlighting its impermanence. This awareness helps foster emotional stability and a greater sense of calm. Both scientific research and ancient mindfulness teachings support the practice of breath awareness as a way to regulate emotions. By focusing on the breath and maintaining a consistent breathing rhythm, individuals can gain better control over anxiety symptoms as they emerge. In this section, the conclusion will unfold and analyze the answers to the key questions of this project.

5.2 Answers to Project Research Questions

How does mindfulness-based intervention (MBI) compare to pharmacotherapy in terms of effectiveness for treating anxiety?

The author of this project believes that both mindfulness-based interventions and medication are effective for treating anxiety in the short term. However, mindful breathing meditation has the potential to surpass medication in the long run by addressing the root causes

of anxiety. Mindfulness helps people find inner peace, as explained by Ven. Thich Nhat Hanh (2007). With regular practice, people with anxiety can start to understand the idea of "non-self," (H.Thich, 2023) which means not holding tightly to thoughts or feelings. Mindfulness is a practical and effective technique for addressing mental disorders by targeting the root causes within the mind. Buddhism is to purified and fix the mind. In 2023, Ven. Thich Huyen Chau shared in a Dharma class that meditative focus reaches deep levels of the mind and has the power to cultivate wisdom. With this insight, individuals can begin to see the root causes of their anxiety and develop the ability to respond with awareness rather than react impulsively. He emphasized that practicing mindful breathing as a daily routine helps to calm the mind, and in turn, a calm mind positively influences the body, bringing physiological functions into a more balanced and peaceful state. Since anxiety tends to surge quickly, it requires an immediate method to calm it down. Mindfulness is that tool. This understanding helps them become stronger and better at handling negative emotions or stressful situations. When someone reaches a deep sense of peace through mindfulness, they are less likely to react strongly to anxiety symptoms when they appear. Instead of getting caught up in those feelings, they learn to let them go (H. Thich, 2023). Because of this, people who keep practicing mindfulness are less likely to have anxiety come back in the future.

Medications have been researched for many years, and clinical trials have confirmed their effectiveness. However, many of these drugs were originally developed for depression and are used "off-label" for anxiety. This type of treatment requires patients to follow their prescribed plan, which includes regular use, time for the medication to work, and dosage adjustments. Although beneficial, long-term medication use may lead to an increased risk of side effects, including serious ones like suicidal thoughts. Over time, the body may become less responsive

to the medication, reducing its effectiveness. As a result, higher doses or combinations with other drugs are often needed, which can increase side effects and make it harder for patients to stay on their treatment. These side effects sometimes cause people to stop taking their medication. So far, only one clinical trial—conducted by Hoge et al. (2023) —has directly compared medication with mindfulness, showing that both treatments are equally effective. The trial involved an 8-week mindfulness-based therapy program—including breathing exercises, body scans, and yoga—compared to a daily dose of 10–20 mg of escitalopram. A total of 276 participants, all over the age of 18 and from diverse ethnic backgrounds (including White, Hispanic, African American, Asian, and Native American), took part in the study. Results measured using the Clinical Global Impression-Severity (CGI-S) scale showed that both treatments were effective in reducing anxiety symptoms. Based on the literature section and methodology section of this project, the author of this project agrees that both medication and mindfulness are effective for treating anxiety in the short term. However, she believes that mindfulness is more effective than medication in the long term, particularly in preventing relapse. Meditation targets the root causes of anxiety by cultivating emotional regulation and mental stability, medication only manages surface-level symptoms and offers short-term relief. Without addressing the mental root, individuals may face lifelong dependence on pharmacological treatment. As a result, she considers mindful breathing a technique that can offer lasting relief—and potentially permanent treatment—for anxiety, surpassing the effects of medication.

Should mindfulness of breathing be considered an adjunct to pharmacotherapy for anxiety treatment?

In pharmacotherapy, the term adjunct refers to a treatment used alongside the primary therapy to enhance overall effectiveness and improve outcomes. The author 12 years of experience as a pharmacist, she has seen anxiety medications used almost as routinely as daily meals. They have become essential for many patients living with anxiety. However, despite regular use, some patients still report struggling with relapse and difficulty maintaining long-term control. According to the studies mentioned above, patients must take their medication as prescribed by their healthcare provider, and it usually takes several weeks before noticeable improvements occur. When patients follow instructions, they often see a reduction in anxiety symptoms after a few weeks. While some medications can relieve symptoms within a few hours, only a few work in under five minutes. However, symptoms can return even after initial relief—this is called a relapse. Clinical trials in literature section have shown that relapses can still happen, even with medications that are effective in the short term. Medication offers only temporary relief by suppressing physical symptoms for as long as it remains active, without addressing the deeper cause of the problem. It does not equip individuals with the skills needed to cope with or prevent anxiety in the long run. Pharmacotherapy should not be use alone to treat anxiety. Medications cannot truly treat anxiety—they only suppress its symptoms—because they don't address the root cause of suffering. Anxiety often begins with past experiences and interactions that shape negative thought patterns, such as constant "what if" thinking and fear of future events (Hanson & Mendius, 2009). Medication cannot break the cycle of negative thinking, so once it wears off, the anxiety often returns. Without addressing the underlying mental patterns, the root cause remains unchanged

On the other hand, meditation has shown promising results in managing anxiety. Mindfulness acts both as a form of healing and a practical tool to treat and prevent anxiety.

Mindfulness targets the root of anxiety by working directly with the mind. Anxiety often stems from implicit memories that trigger overactive responses and disrupt the brain's chemical balance (Hanson and Mendius, 2009). As Hanson and Mendius (2009) suggested, these triggers begin in the mind. Mindfulness helps to heal the mind by calming mental activity, which in turn brings balance to the body's chemistry. Sitting still and focusing on the breath also helps relax the body, showing how mindfulness—though centered on the mind—naturally soothes the physical body as well. As mindfulness practice deepens, the need for medication may decrease. Over time, individuals can more easily return to a state of inner balance whenever anxiety arises. With daily practice, mindfulness can lead to deeper states of calm. This allows people not only to manage anxiety but also to live with greater ease and stability.

The author of this project believes that mindfulness should be integrated as a supportive therapy alongside medication, particularly for individuals experiencing more severe symptoms. While medication can offer rapid relief by calming the body's physical responses, mindfulness gradually enhances the mind's capacity to remain steady and resilient. In milder cases, where symptoms are less intense, the author suggests that individuals may benefit from starting with breathing meditation before considering medication. Over time, mindfulness of breathing has the potential not only to treat anxiety but also to prevent its recurrence, promoting long-term mental and emotional well-being.

Can mindful breathing effectively treat anxiety as a standalone therapy?

Researches from Chapter 3 and Chapter 4 of this project have provided concrete proof that mindfulness can be effective in easing anxiety disorders. Symptoms like a racing heart, fear, and shortness of breath often lessen when a person becomes calm. One of the central techniques in mindfulness is focusing on the breath—a simple, accessible, and emotionally neutral object of

attention. Because the breath is always available and generally free from negative associations, it serves as an effective focus point for the mind. Mindfully observing the breath as it flows in and out helps reduce mental distractions and strengthens the connection between body and mind. Repeated focus on this pure object gradually settles the body and brings about changes in brain chemistry related to emotions and physiological responses (Mace, 2007) (Calderone et al., 2024). Good posture is important in mindfulness practice. Sitting up straight reduces unnecessary movement and helps the body's chemistry flow more smoothly. Breathing involves taking in oxygen and releasing carbon dioxide, which is essential for our body to function properly (N. Thich, 2007). When we sit still and align our bodies, breathing becomes more efficient, helping oxygen reach our cells and maintain health. In the literature section, mindful breathing may take time to show results, but it can help reduce the chances of anxiety returning by improving self-awareness and emotional control. Research in the literature shows that mindfulness can balance key brain chemicals like GABA, dopamine, and norepinephrine—chemicals that anxiety medications also target. This shows that mindfulness can calm anxiety in a similar way to medication, but with fewer side effects. The author of this project believes that meditation can help regulate emotions and induce a sense of calm, which not only prevents anxiety symptoms from arising but also aids in managing those that have already surfaced.

From a Buddhist perspective, meditation is a way to purify the mind by fostering detachment from negative thoughts and emotions, which are often viewed as the root causes of both physical and mental suffering (Goenka, 2000). As individuals meditate, they begin to observe the impermanence of the breath and everything around them, which gradually helps to clear the mind (H. Thich, 2023). Studies in Chapter 3 and Chapter 4 of this project confirmed that meditation is effective in reducing anxiety, as described in the commentaries. Research from

Calderon (et al., 2024) suggests that mindfulness helps change the brain's structure, improving emotional control and calming behavior. Dr. Tobias Esch (2014) also found that mindfulness helps balance brain chemicals that are out of sync during anxiety attacks. Mindfulness meditation can work alongside medication, potentially reducing healthcare costs while improving treatment outcomes. It has long-term benefits for emotional balance, cognitive function, and overall mental health. Beyond what medication can provide, mindfulness also cultivates deeper awareness and wisdom (Buddhadasa, 1976). The author of this project believes that mindfulness of breathing has the potential to serve as a stand-alone therapy for treating anxiety and preventing its relapse, guiding individuals toward a more balanced, peaceful, and liberated state of being.

What is the connection between traditional Buddhist practices and the modern health field?

The original context of mindfulness is a technique within Buddhism – it is tool to realize enlightenment. Kearney (2001) explained that the Buddha's teachings were originally passed down through oral tradition, which is why they were often concise and presented in short verses to aid memorization. The original suttas are structured with layered lists—lists within lists—designed to support memorization by the mind, rather than to serve as an academic or systematic layout. Many sets of teachings are deeply interconnected, forming a complex but cohesive framework. While the starting point of the Dhamma may vary in style depending on an individual's preferences or understanding, the ultimate goal remains the same: liberation, which can only be realized through personal practice (Patrick Kearney, 2001). Enlightenment, characterized by mental clarity and freedom from suffering, may serve as a powerful tool in the therapeutic process for anxiety disorders.

This project's author believes that traditional Buddhist breathing techniques may offer valuable support for addressing anxiety and various mental health issues. While Buddhist mindfulness has been practiced for over 2,000 years, it has only been studied scientifically in the past century. The research literature in Chapters 2 and 3 indicates that mindfulness can serve as a key tool in transforming the negativity of fear and distress associated with anxiety into greater self-awareness and a more positive, balanced state of mind. Further studies are necessary to examine how different levels of mindfulness breathing might interact with various forms of psychotherapy, as the full potential of Buddhist meditation practices is still undiscovered. Meditation is increasingly supported by scientific evidence. In particular, brain imaging and other measurement tools have shown that breathing-based meditation can be effective in treating anxiety (Mace, 2007). Mindfulness practices have demonstrated a direct impact on both the body and the mind.

According to findings by Elaheh (2009–2010), an estimated 30 million people in the United States were diagnosed with anxiety disorders during the years 2009 to 2010. Of those affected, approximately 3,000 individuals had attempted suicide. By 2013, the cost of treating anxiety disorders were estimated around $48 billion, with roughly 90% of that amount attributed to doctor visits, medications, and emergency room care (Shirneshan, 2013). With approximately 300 million people affected by anxiety disorders worldwide, and 1.49 billion meditation-related apps—including those focused on breathing (*Meditation Management Apps Market Size Report, 2030*, n.d.), body relaxation, and yoga—available in 2023, this reinforces the need for mindfulness meditation. Breathing meditation, as part of the broader trend of meditation apps, has proven to be effective in addressing anxiety. Breathing meditation is particularly effective because it is a natural part of the body and always accessible. Mindfulness-Based Interventions

(MBI) are cost-effective and free from side effects. It can prevent relapse, offer long-term benefits, improve patients' physical and mental wellness, and lessen the burden on healthcare spending. Mindfulness of breathing can be a valuable tool in improving and treating mental health conditions within psychotherapy field globally. The author of this project advocates for further clinical trials to explore additional benefits that breathing meditation may offer.

5.3 Limitations

This section outlines the project's limitations, noting that both medication and mindfulness of breathing have benefits and drawbacks that may not be fully explored. This project does not aim to represent all research on mindfulness or its various forms. Instead, it focuses specifically on mindfulness of breathing. The studies included were selected based on their relevance to this specific practice. Due to limited access to some resources, the scope of research is somewhat restricted. However, the meta-reviews used in this project cover a wide range of recent studies, with careful selection emphasizing breath-focused mindfulness. Many clinical trials evaluating mindfulness have relatively short durations—often around eight weeks. This is much shorter than the period recommended by Thich Nhat Hanh (2007), who suggests a minimum of three months of consistent daily practice. Such short trial periods may not allow enough time for participants to fully adjust, deepen their awareness, or experience the full benefits of meditation. The body and mind need time to adapt, and the gradual development of mindfulness is key to building long-term emotional regulation and inner calm. Had the trials continued for three months or more, it is possible that mindfulness would have shown even greater effectiveness than medication. Another limitation is the inconsistency in guidance and methodology. Trials often do not clearly describe the qualifications or experience level of meditation instructors. In addition, most trials don't specify important details—such as whether

the breathing was through the nose or focused on bodily sensations, or which Buddhist tradition the techniques came from. These missing details mean that outcomes may be spread across different practices, making it hard to evaluate the specific effectiveness of mindfulness of breathing.

The wide range of settings, populations, medications, techniques, measurement tools, and criteria makes it challenging for practitioners and difficult to standardize in research. To properly evaluate mindfulness of breathing, future research should focus on one consistent technique and clearly document the process. Consistency in practice is crucial for success, but clinical trials rarely track how regularly participants meditate. If some participants were inconsistent, this could weaken the overall outcomes. Furthermore, many studies include mixed mindfulness techniques rather than focusing solely on breathing meditation, which dilutes the results. Using multiple methods in a short period might not give participants enough time to adapt or experience meaningful change. Additionally, they primarily drew from Jon Kabat-Zinn's model, without exploring other established mindfulness traditions. There was no mention of whether the researchers themselves had personal experience with mindfulness breathing, which is essential for conducting authentic trials.

There are also limitations in the commentaries used to support mindfulness practices. Commentaries from monks and well-known Buddhist practitioners offer valuable insights, but they also come with certain limitations. Firstly, many of the teachings on mindfulness of breathing found in the suttas are translated texts and often lack detailed explanations—such as how long one should practice or what timeframe is needed to progress through each level of meditation. Many Buddhist scriptures and commentaries were originally written for monastics, which limits their accessibility and relatability for laypeople. The language and style are tailored

to the monastic context, making it difficult for those without a Buddhist background to fully grasp the teachings. Language can be another barrier. Some mindfulness teachings have not yet been translated into English, making them less accessible to Western audiences. Mindfulness practices in this project only based on the Theravāda approach. Even within Theravāda sources, consistency can be hard to find due to differing interpretations among authors. Without access to clear and complete instructions, it's more difficult for practitioners to fully understand and apply the Buddha's teachings in a way that leads to deep meditative states. The lack of clear, easy-to-understand guidance requires therapists or meditation instructors to seek resources that help them understand the correct methods for cultivating the benefits of traditional teachings.

5.4 Strengths

This project highlights several strengths. It includes insights from monks and experienced Buddhists, which align with modern research, showing that mindfulness of breathing can be highly effective—especially when practiced consistently and with proper guidance. One study by Maria Komariah (et al. 2022) showed that mindfulness can be effective even when taught remotely, provided there is regular follow-up and group engagement through remote communication. Practicing in a group can boost motivation, as people tend to stay engaged when others are participating in the same activity. Group support also helps individuals stay on track. Regular follow-up serves as a reminder and encourages better commitment to the practice. Although the study didn't specify a particular breathing technique, it showed that the benefits of mindful breathing don't rely on technique alone. The focus is simply on the breath itself, which is neutral—neither pleasant nor unpleasant—making it easier to concentrate on. Breath, in this context, represents purity, which contrasts with mental defilements (Goenka &Hart, 2000). Our minds can only focus on one state at a time—positive or negative—so using

the breath as a pure anchor can help steer the mind away from negative emotions like fear or anger. Breathing because it is considered the starting point of Vipassana meditation and is central in the Buddha's teachings.

Breathing meditation offers a convenient solution for today's busy lives. While many may not have time for traditional meditation, mindful breathing is accessible, free, and can be practiced anytime, anywhere. As mentioned in the literature and methodology section, there are many different breathing styles, which gives practitioners flexibility to choose what works best for them. Research using brain imaging has demonstrated that mindfulness practice supports enhanced cognitive abilities, emotional regulation, and self-awareness (Calderone et al., 2024). These findings support the idea that, when done properly, mindfulness—especially mindfulness of breathing—can function as a form of cognitive and acceptance-based therapy. However, in Fumero (et al. 2020) have reported that a small number of individuals experience adverse effects such as stress or panic attacks. The reasons for these mixed results are likely complex and multifactorial, potentially involving levels of participant compliance, the quality of guidance received, individual background, psychological history, and even socio-economic status. Without this context, it's difficult to determine whether the negative effects were caused by the technique itself or by a misunderstanding or misapplication of it in (Fumero et al. 2020). The author of this project has personally practiced breathing-based mindfulness to manage anxiety and stress. Although she studied the Four Foundations of Mindfulness in Vipassana at Sakya Buddha University, she frequently turns to mindful breathing as her starting point for dealing with stress. Through this practice, she has noticed an improved ability to regain control more quickly than before. This personal experience is another reasons she chose to focus on this theme for the project.

5.5 Future research

The findings from this project open new possibilities for deeper integration between Buddhism and Western psychotherapy. Buddhism seeks to address the root causes of mental suffering, including anxiety, by transforming the mind rather than merely suppressing symptoms. Its ultimate purpose is to cultivate inner calm and reduce suffering—for both oneself and others.

With the growing popularity of mindfulness in recent decades, the author believes these results highlight how Buddhist practices can contribute meaningfully to global mental health and well-being. Mindfulness can cultivate positive energy, and when positivity is present, it naturally reduces the rise of negativity. When the mind becomes more stable through rhythmic, mindful breathing, individuals often experience improved emotional balance, increased self-compassion, and even enhanced effectiveness of medications—potentially allowing for quicker absorption and better outcomes. This suggests that combining mindfulness with conventional treatments could improve results across a range of health conditions. While medications often provide quick relief, they can carry long-term risks. In contrast, mindfulness offers a more gradual, lasting transformation, though it requires consistent effort and clear guidance.

These insights could inspire Buddhist organizations to develop more programs and retreats, both in-person and through digital platforms. Guided by experienced monks, nuns, or long-term practitioners, such programs can help people build emotional regulation and self-awareness. Over time, trained mindfulness practitioners could also contribute to clinical studies, strengthening the evidence base for mindfulness in various fields of psychotherapy. At present, several Buddhist institutions offer retreats focused on the practice of mindfulness for the benefit of the wider community. These include the Goenka Vipassana centers founded by S.N. Goenka,

Plum Village established by Venerable Thich Nhat Hanh, and Sakya Buddha University led by Venerable Thich Huyen Chau. Future research should focus on addressing existing gaps and limitations, helping individuals make informed choices about their mental health treatments based on what works best for their unique situations. There is a need for longitudinal research.

Bibliography

10 Day Courses | Vipassana Research Institute. (n.d.). Retrieved March 16, 2025, from https://www.vridhamma.org/10-Day-Courses

About | Learning to be Self-Compassionate | Chris Germer. (2004). Germer Site. Retrieved March 2, 2025, from https://chrisgermer.com/about/

Adrenal Hormones. (2022, January 24). https://www.endocrine.org/patient-engagement/endocrine-library/hormones-and-endocrine-function/adrenal-hormones

American Adults Express Increasing Anxiousness in Annual Poll; Stress and Sleep are Key Factors Imp. (n.d.). Retrieved May 9, 2025, from https://www.psychiatry.org:443/news-room/news-releases/annual-poll-adults-express-increasing-anxiousness

APA. (n.d.). *What are Anxiety Disorders?* Retrieved February 2, 2025, from https://www.psychiatry.org:443/patients-families/anxiety-disorders/what-are-anxiety-disorders

Ativan. (n.d.). Retrieved February 22, 2025, from https://labeling.pfizer.com/ShowLabeling.aspx?id=15212

Ativan, Loreev XR (lorazepam) dosing, indications, interactions, adverse effects, and more. (n.d.). Retrieved March 16, 2025, from https://reference.medscape.com/drug/ativan-loreev-xr-lorazepam-342906

Bandelow, B., Lichte, T., Rudolf, S., Wiltink, J., & Beutel, M. E. (2015). The German guidelines for the treatment of anxiety disorders. *European Archives of Psychiatry and Clinical Neuroscience*, *265*(5), 363–373. https://doi.org/10.1007/s00406-014-0563-z

Bandelow, B., Michaelis, S., & Wedekind, D. (2017). Treatment of anxiety disorders. Dialogues in Clinical Neuroscience, 19(2), 93–107. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5573566/

Bazely, S. (2023, January 27). *How anxiety impacts everyday life*. MentalHealth.Com. https://www.mentalhealth.com/library/anxiety-impact-on-daily-life

Bhikkhu Sujato. (n.d.-a). *Ānāpānassatisutta—Bhikkhu Sujato*. SuttaCentral. Retrieved February 7, 2025, from https://suttacentral.net/mn118/en/sujato

Bhikkhu Sujato. (n.d.-b). *Mahāsatipaṭṭhānasutta—Bhikkhu Sujato*. SuttaCentral. Retrieved February 23, 2025, from https://suttacentral.net/dn22/en/sujato

Bishop, S. R., Lau, M., Shapiro, S., Carlson, L., Anderson, N. D., Carmody, J., Segal, Z. V., Abbey, S., Speca, M., Velting, D., & Devins, G. (2004). Mindfulness: A proposed operational definition. *Clinical Psychology: Science and Practice*, *11*(3), 230–241. https://doi.org/10.1093/clipsy.bph077

Buddhadasa, B. (1976). *Anapanasati (Mindfulness of Breathing)* (1st ed., Vol. 3). Puran Singh, 1980. Anapanasati (Mindfulness of Breathing). Sublime Life Mission.

Busner, J., & Targum, S. D. (2007). The Clinical Global Impressions Scale. Psychiatry (Edgmont), 4(7), 28–37. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2880930/

Calderone, A., Latella, D., Impellizzeri, F., de Pasquale, P., Famà, F., Quartarone, A., & Calabrò, R. S. (2024). Neurobiological Changes Induced by Mindfulness and Meditation: A Systematic Review. *Biomedicines*, *12*(11), Article 11. https://doi.org/10.3390/biomedicines12112613

CAPP, K. M., BA. (2019, August 28). *The Mindful Attention Awareness Scale (MAAS)*. PositivePsychology.Com. https://positivepsychology.com/mindful-attention-awareness-scale-maas/

Carter, A. (2020, October 13). *The benefits and risks of benzodiazepines*. https://www.medicalnewstoday.com/articles/262809

Chand, S. P., & Marwaha, R. (2025). Anxiety. In *StatPearls*. StatPearls Publishing. http://www.ncbi.nlm.nih.gov/books/NBK470361/

Chu, A., & Wadhwa, R. (2025). Selective Serotonin Reuptake Inhibitors. In *StatPearls*. StatPearls Publishing. http://www.ncbi.nlm.nih.gov/books/NBK554406/

Craske, M. G., Rauch, S. L., Ursano, R., Prenoveau, J., Pine, D. S., & Zinbarg, R. E. (2011). What Is an Anxiety Disorder? *Focus*, *9*(3), 369–388. https://doi.org/10.1176/foc.9.3.foc369

Dawadi, S., Shrestha, S., & Giri, R. A. (2021). Mixed-Methods Research: A Discussion on its Types, Challenges, and Criticisms. *Journal of Practical Studies in Education*, *2*(2), 25–36. https://doi.org/10.46809/jpse.v2i2.20

Effexor®(venlafaxine hydrochloride)Tablets. (n.d.). https://www.accessdata.fda.gov/drugsatfda_docs/label/2008/020151s051lbl.pdf

Effexor XR, Venbysi XR (venlafaxine) dosing, indications, interactions, adverse effects, and more. (n.d.). Retrieved March 16, 2025, from https://reference.medscape.com/drug/effexor-xr-venbysi-xr-venlafaxine-342963#90

Esch, T. (2014). The Neurobiology of Meditation and Mindfulness. In S. Schmidt & H. Walach (Eds.), *Meditation – Neuroscientific Approaches and Philosophical Implications* (pp. 153–173). Springer International Publishing. https://doi.org/10.1007/978-3-319-01634-4_9

Farach, F. J., Pruitt, L. D., Jun, J. J., Jerud, A. B., Zoellner, L. A., & Roy-Byrne, P. P. (2012). Pharmacological treatment of anxiety disorders: Current treatments and future directions. *Journal of Anxiety Disorders*, *26*(8), 833–843. https://doi.org/10.1016/j.janxdis.2012.07.009

Fumero, A., Peñate, W., Oyanadel, C., & Porter, B. (2020). The Effectiveness of Mindfulness-Based Interventions on Anxiety Disorders. A Systematic Meta-Review. *European Journal of Investigation in Health, Psychology and Education*, *10*(3), Article 3. https://doi.org/10.3390/ejihpe10030052

Garakani, A., Murrough, J. W., Freire, R. C., Thom, R. P., Larkin, K., Buono, F. D., & Iosifescu, D. V. (2020). Pharmacotherapy of Anxiety Disorders: Current and Emerging Treatment Options. *Frontiers in Psychiatry*, *11*, 595584. https://doi.org/10.3389/fpsyt.2020.595584

Goenka, S. N., & Hart, W. (2000). *The discourse summaries: Talks from a ten-day course in Vipassana meditation*. Vipassana Research Publications.

Goleman, D. (2015). *Focus: The hidden driver of excellence* (First Harper paperback edition). Harper.

Goleman, D., & Davidson, R. J. (2018). *Altered Traits*: Science reveals how meditation changes your mind, brain, and body (First trade paperback edition). Avery, an imprint of Penguin Random House LLC.

Grillon, C., Robinson, O. J., Cornwell, B., & Ernst, M. (2019). Modeling anxiety in healthy humans: A key intermediate bridge between basic and clinical sciences. *Neuropsychopharmacology*, *44*(12), 1999–2010. https://doi.org/10.1038/s41386-019-0445-1

Hanson, R., & Mendius, R. (2009). *Buddha's brain: The practical neuroscience of happiness, love, and wisdom* (Online-Ausg). New Harbinger.

Harvey, P., Agócs, T., Harvey, P., Śraddhāpa, D., Premasiri, P. D., & Somaratne, G. A. (2017). COMMON BUDDHIST TEXT: GUIDANCE AND INSIGHT FROM THE BUDDHA. *Mahachulalongkornarajavidyalaya University Press*.

Hoge, E. A., Bui, E., Marques, L., Metcalf, C. A., Morris, L. K., Robinaugh, D. J., Worthington, J. J., Pollack, M. H., & Simon, N. M. (2013). Randomized Controlled Trial of Mindfulness Meditation for Generalized Anxiety Disorder: Effects on Anxiety and Stress Reactivity. *The Journal of Clinical Psychiatry*, *74*(8), 786–792. https://doi.org/10.4088/JCP.12m08083

Hoge, E. A., Bui, E., Mete, M., Dutton, M. A., Baker, A. W., & Simon, N. M. (2023). Mindfulness-Based Stress Reduction vs Escitalopram for the Treatment of Adults With Anxiety Disorders: A Randomized Clinical Trial. *JAMA Psychiatry*, *80*(1), 13–21. https://doi.org/10.1001/jamapsychiatry.2022.3679

Hölzel, B. K., Carmody, J., Vangel, M., Congleton, C., Yerramsetti, S. M., Gard, T., & Lazar, S. W. (2011). Mindfulness practice leads to increases in regional brain gray matter density. *Psychiatry Research*, *191*(1), 36–43. https://doi.org/10.1016/j.pscychresns.2010.08.006

Ibrahim, K., Komariah, M., & Herliani, Y. K. (2022). The Effect of Mindfulness Breathing Meditation on Psychological Well-being: A Quasi-Experimental Study Among Nurses Working for COVID-19 Patients. *Holistic Nursing Practice*, *36*(1), 46–51. https://doi.org/10.1097/HNP.0000000000000464

Kazantzis, N. (2024). Cognitive Behavioral Therapy. *Psychiatric Clinics of North America*, *47*(2), 301–310. https://doi.org/10.1016/j.psc.2024.03.002

Kenwood, M. M., Kalin, N. H., & Barbas, H. (2022). The prefrontal cortex, pathological anxiety, and anxiety disorders. *Neuropsychopharmacology*, *47*(1), 260–275. https://doi.org/10.1038/s41386-021-01109-z

Komariah, M., Ibrahim, K., Pahria, T., Rahayuwati, L., & Somantri, I. (2022). Effect of Mindfulness Breathing Meditation on Depression, Anxiety, and Stress: A Randomized Controlled Trial among University Students. *Healthcare*, *11*(1), 26. https://doi.org/10.3390/healthcare11010026

Levate (amitriptyline), dosing, indications, interactions, adverse effects, and more. (n.d.). Retrieved March 16, 2025, from https://reference.medscape.com/drug/levate-amitriptyline-342936#0

Lexapro (escitalopram) dosing, indications, interactions, adverse effects, and more. (n.d.). Retrieved March 16, 2025, from https://reference.medscape.com/drug/lexapro-escitalopram-342961#91

Lexapro (escitalopram oxalate). (n.d.). https://www.fda.gov/media/135185/download

Mace, C. (2007). Mindfulness in psychotherapy: An introduction. *Advances in Psychiatric Treatment*, *13*(2), 147–154. https://doi.org/10.1192/apt.bp.106.002923

Margaux Kenwood—IMPRINT Publication Science | LinkedIn. (n.d.). Retrieved February 27, 2025, from https://www.linkedin.com/in/margaux-kenwood-8734b7244

Meditation Management Apps Market Size Report, 2030. (n.d.). Retrieved April 19, 2025, from https://www.grandviewresearch.com/industry-analysis/meditation-management-apps-market-report

Melaragno, A. J. (2021). Pharmacotherapy for Anxiety Disorders: From First-Line Options to Treatment Resistance. *Focus*, *19*(2), 145–160. https://doi.org/10.1176/appi.focus.20200048

Michelle G. Craske, Ph.D – Anxiety and Depression Research Center at UCLA. (n.d.). Retrieved February 27, 2025, from https://anxietydepression.psych.ucla.edu/people/michelle-g-craske-ph-d

Mindfulness meditation: A research-proven way to reduce stress. (n.d.). [10/30/2019]. Https://Www.Apa.Org. Retrieved February 6, 2025, from https://www.apa.org/topics/mindfulness/meditation

NAMI. (2017, December). Anxiety Disorders. *NAMI*. https://www.nami.org/about-mental-illness/mental-health-conditions/anxiety-disorders/

Nhất Hạnh, Neumann, R., & Nhất Hạnh. (2006). *Understanding our mind* (Rev. pbk. ed). Parallax Press : Distributed by Publishers Group West.

Patrick Kearney. (2001). EVAý ME SUTTAý This is how I heard it-Week two: The oral tradition. https://www.buddhistelibrary.org/en/albums/asst/ebook/02_.pdf

Purse, M. (2022, November 7). *Overview of Tricyclic Antidepressants*. Verywell Mind. https://www.verywellmind.com/tricyclic-antidepressants-379652

Roemer, L., Williston, S. K., & Rollins, L. G. (2015). Mindfulness and emotion regulation. *Current Opinion in Psychology*, *3*, 52–57. https://doi.org/10.1016/j.copsyc.2015.02.006

Russo, M. W. (2007). How to Review a Meta-analysis. Gastroenterology & Hepatology, 3(8), 637–642. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3099299/

Sanchali Bedi. (n.d.). *Abhidharmakosa Bhashya Of Vasubandhu Vol 3 Louis De Vallee Poussin*. Retrieved March 11, 2025, from http://archive.org/details/abhidharmakosabhashyaofvasubandhuvol3louisdevalleepoussin_594_X

Seo, D., Patrick, C. J., & Kennealy, P. J. (2008). Role of Serotonin and Dopamine System Interactions in the Neurobiology of Impulsive Aggression and its Comorbidity with other Clinical Disorders. *Aggression and Violent Behavior*, *13*(5), 383–395. https://doi.org/10.1016/j.avb.2008.06.003

Serotonin: What Is It, Function & Levels. (n.d.). Retrieved February 19, 2025, from https://my.clevelandclinic.org/health/articles/22572-serotonin

Serpa, J. G., Taylor, S. L., & Tillisch, K. (2014). Mindfulness-based stress reduction (MBSR) reduces anxiety, depression, and suicidal ideation in veterans. *Medical Care*, *52*(12 Suppl 5), S19-24. https://doi.org/10.1097/MLR.0000000000000202

Shapero, B. G., Greenberg, J., Pedrelli, P., de Jong, M., & Desbordes, G. (2018). Mindfulness-Based Interventions in Psychiatry. *Focus: Journal of Life Long Learning in Psychiatry*, *16*(1), 32–39. https://doi.org/10.1176/appi.focus.20170039

Sharon Salzberg. (2013, September 29). *The Gift Goenka Gave Us*. Lion's Roar. https://www.lionsroar.com/the-gift-goenka-gave-us/

Shirneshan, E. (2013). Cost of Illness Study of Anxiety Disorders for the Ambulatory Adult Population of the United States. *Theses and Dissertations (ETD)*. https://doi.org/10.21007/etd.cghs.2013.0289

Soma Thera. (1998). *The Way of Mindfulness: The Satipatthana Sutta and Its Commentary*. https://www.accesstoinsight.org/lib/authors/soma/wayof.html#breathing

Tang, Y.-Y., Hölzel, B. K., & Posner, M. I. (2015). The neuroscience of mindfulness meditation. *Nature Reviews Neuroscience*, *16*(4), 213–225. https://doi.org/10.1038/nrn3916

Thanissaro Bhikkhu. (n.d.). *Mindfulness of Breathing | dhammatalks.org*. Retrieved March 9, 2025, from https://www.dhammatalks.org/books/uncollected/Mindfulness_ofBreathing.html

Thanissaro Bhikkhu. (2013). *Meditations 3* (4th ed.). Metta Forest Monastery.

The Importance of Natural Respiration by S N Goenka | Vipassana Research Institute. (n.d.). Retrieved April 5, 2025, from https://www.vridhamma.org/node/1940

The Latest Mental Health Statistics: What the Numbers Say About the State of Our Minds in 2024 | Huntington Psychological Services. (2024, August 14). https://huntingtonpsych.com/the-latest-mental-health-statistics-what-the-numbers-say-about-the-state-of-our-minds-in-2024

Thibaut, F. (2017). Anxiety disorders: A review of current literature. *Dialogues in Clinical Neuroscience*, *19*(2), 87–88.

Thich, Huyen Chau. (2023). *Vimalakīrti – The Radiant Heart Amidst the Mango Grove* (Vol. 1).(English has not yet published)

Thich Nhat Hanh. (2007, September 20). *What is mindfulness?* Plum Village. https://plumvillage.org/library/clips/what-is-mindfulness

Thich Nhat Hanh. (2021, October 30). *Discourse on the Full Awareness of Breathing*. Plum Village. https://plumvillage.org/library/sutras/discourse-on-the-full-awareness-of-breathing

Thích-Nhất-Hạnh. (1999). *The Miracle of Mindfulness: An Introduction to the Practice of Meditation*. Beacon Press.

WHO. (2023, September 27). *Anxiety disorders*. https://www.who.int/news-room/fact-sheets/detail/anxiety-disorders

Why Aren't My Antidepressants Working? (2024, June 20). https://www.hopkinsmedicine.org/health/wellness-and-prevention/why-arent-my-antidepressants-working

Winston, D. (2016, February 26). *A 6-Minute Breathing Meditation To Cultivate Mindfulness*. Mindful. https://www.mindful.org/a-five-minute-breathing-meditation/

Zhou, X., Guo, J., Lu, G., Chen, C., Xie, Z., Liu, J., & Zhang, C. (2020). Effects of mindfulness-based stress reduction on anxiety symptoms in young people: A systematic review and meta-analysis. *Psychiatry Research*, *289*, 113002. https://doi.org/10.1016/j.psychres.2020.113002

Zoppi, L. (2019, January 23). *Norepinephrine and Mental Health*. News-Medical. https://www.news-medical.net/health/Norepinephrine-and-Mental-Health.aspx